Documents and Addresses

Accreditation

The Prüffeld der Schaltwerke, Berlin has been approved by the DAkkS (German accreditation body) according to EN ISO/IEC 17025 for tests in the field of high-voltage switchgear and controlgear and power engineering equipment (Registration-No D-PL-11055-10-01).

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PSW-Documents

A Certificate

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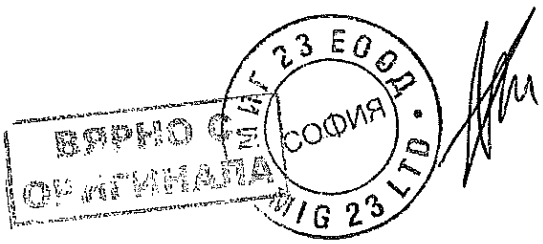
A Test Confirmation

is issued immediately after the tests. It confirms that the tests have been conducted and is valid only until publishing the detailed results in an entire document.

Addresses

Testing Station:	Prüffeld der Schaltwerke, Berlin Siemens AG EM MS R&D OC TD Nonnendammallee 104 13629 Berlin Germany
Manufacturer:	Siemens AG EM MS O SD BLN MF Nonnendammallee 104 13629 Berlin Germany
Client:	Siemens AG EM MS R&D OC Nonnendammallee 104 13629 Berlin Germany



Technical Data of Test Object
Circuit-Breaker

Test object:	Three-pole vacuum circuit-breaker
Designation:	3AE5324-2 with vacuum interrupters VSS12-1-31-A5
Manufacturer:	Siemens AG, EM MS O SD BLN MF, Berlin
Serial No.:	S 3AE5/00004949
Year of manufacture:	2015
Drawing No.:	Drawings and parts lists - see sheet 6

Ratings assigned by the manufacturer:

Rated voltage	24	kV
Rated normal current	1250	A
Rated frequency	50/60	Hz
Rated lightning impulse withstand voltage	125	kV
Rated switching impulse withstand voltage	-	kV
Rated power-frequency withstand voltage	65	kV
Rated peak withstand current	65	kA
Rated short-time withstand current	25	kA
Rated duration of short-circuit	3	s
Rated short-circuit breaking current	25	kA
DC component of the rated short-circuit breaking current	50	%
(Valid for a minimum opening time of 21 ms, a relay-time of 10 ms and a time constant of 45 ms)		
Rated short-circuit making current	65	kA
Rated transient recovery voltage	41.2	kV
Rate of rise of transient recovery voltage	0.47	kV/µs
First-pole-to-clear factor	1.5	
Rated operating sequence	O - 0.3 s - CO - 15 s - CO	
Arc extinguishing medium	Vacuum	
Rated filling pressure for interruption	-	MPa abs. at 20 °C
Minimum functional pressure for interruption	-	MPa abs. at 20 °C
Insulating medium	Air	
Rated filling pressure for insulation	-	MPa abs. at 20 °C
Minimum functional pressure for insulation	-	MPa abs. at 20 °C
Driving mechanism (type)	Spring, charged by motor	
Number of poles	3	
Number of units per pole	1	
Rated opening time	< 60	ms
Rated closing time	< 60	ms
Rated supply voltage of opening device	110	V d.c.
Rated supply voltage of closing device	110	V d.c.
Rated supply voltage of auxiliary circuits	110	V d.c.
Rated frequency of supply voltage	-	Hz
Rated line /cable-charging breaking current	10 / 31.5	A
Rated single capacitor bank breaking current	400	A
Classification of circuit-breaker	Class M2, E2, C2, S1	

Further data:

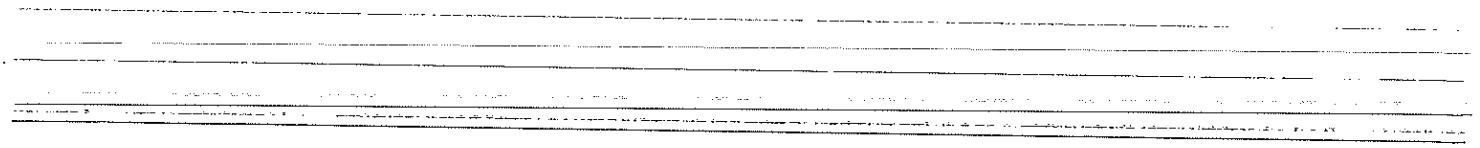
Serial number of vacuum interrupter in pole L1 / L2 / L3	S 990122 / S 000147 / S 000152
Pole centre distance	210 mm
Width across flats	310 mm

Essential characteristics:

-

ВЯРНО С ОРИГИНАЛА

MIG 23 EOOD СОФИЯ MIG 23 LTD



Prüffeld der Schaltwerke
Berlin

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-11055-10-01

Test Report

Report No.: 15-054-MS-2 **Copy No.:** 0 **Contents:** 60 Sheets

Test object: Three-pole vacuum circuit-breaker

Designation: 3AE5324-2 with vacuum interrupters VSS12-1-31-A5
Rated voltage: 24 kV Rated normal current: 1250 A Rated frequency: 50/60 Hz
Rated short-circuit breaking current: 25 kA

Manufacturer: Siemens AG, EM MS O SD BLN MF, Berlin

Client: Siemens AG, EM MS R&D OC, Berlin

Testing station: Prüffeld der Schaltwerke, Berlin

Date of test: August 27 - 31, 2015

Applied test specifications:

IEC 62271-1, Edition 1.1, 2011-08
IEC 62271-100, Edition 2.1, 2012-09
Client instruction based on 17A/1093/CD, 2015-04

Tests performed:

Short-circuit tests for a rated current of 25 kA at a rated voltage of 24 kV and a rated frequency of 50 Hz for class S1 in test-duties:
Tests for demonstrating the performance of the circuit-breaker for k_{pp} = 1.3 by additional single-phase fault tests

Single-phase fault test under symmetrical fault conditions for the third-pole-to-clear:
25.4 kA at 15.2 kV in pole L1

Single-phase fault test under symmetrical fault conditions for the second-pole-to-clear:
25.4 kA at 18.4 kV in pole L3

Single-phase fault test under asymmetrical fault conditions for the second and third-pole-to-clear:
25.0 kA at 17.8 kV and 53% dc-component in pole L3

Test results:

The test object has passed the above indicated tests without any objection. The proved performance and the results obtained comply with the requirements mentioned above.

Prüffeld der Schaltwerke Berlin Bereich Mittelspannung

На основание чл.36а ал.3 от ЗОП

Head of

Berlin, October 05, 2015

ВЯРНО С ОРИГИНАЛА

Documents and Addresses

Accreditation

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A Test Confirmation

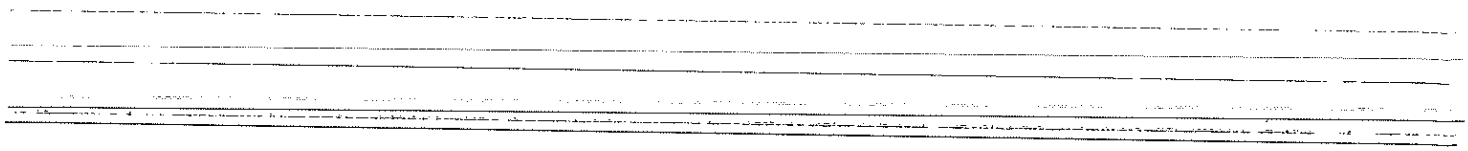
is issued immediately after the tests. It confirms that the tests have been conducted and is valid only until publishing the detailed results in an entire document.

Addresses

Testing Station:	Prüffeld der Schaltwerke, Berlin Siemens AG IC LMV MS R&D OC TD Nonnendammallee 104 13629 Berlin Germany
Manufacturer:	Siemens AG EM MS O SD BLN MF Nonnendammallee 104 13629 Berlin Germany
Client:	Siemens AG EM MS R&D OC Nonnendammallee 104 13629 Berlin Germany

ВЯРНО С ОРИГИНАЛА

ТИГ 23 ЕООД СОФИЯ TIG 23 LTD



Technical Data of Test Object
Circuit-Breaker

Test object:	Three-pole vacuum circuit-breaker
Designation:	3AE5324-2 with vacuum interrupters VSS12-1-31-A5
Manufacturer:	Siemens AG, EM MS O SD BLN MF, Berlin
Serial No.:	S 3AE5/00004949
Year of manufacture:	2015
Drawing No.:	Drawings and parts lists - see sheet 6

Ratings assigned by the manufacturer:

Rated voltage	24 kV	
Rated normal current	1250 A	
Rated frequency	50/60 Hz	
Rated lightning impulse withstand voltage	125 kV	
Rated switching impulse withstand voltage	- kV	
Rated power-frequency withstand voltage	65 kV	
Rated peak withstand current	65 kA	
Rated short-time withstand current	25 kA	
Rated duration of short-circuit	3 s	
Rated short-circuit breaking current	25 kA	
DC component of the rated short-circuit breaking current (Valid for a minimum opening time of 21 ms, a relay-time of 10 ms and a time constant of 45 ms)	50 %	
Rated short-circuit making current	65 kA	
Rated transient recovery voltage	41.2 kV	
Rate of rise of transient recovery voltage	0.47 kV/µs	
First-pole-to-clear factor	1.5	
Rated operating sequence	O - 0.3 s - CO - 15 s - CO	
Arc extinguishing medium	Vacuum	
Rated filling pressure for interruption	- MPa	abs. at 20 °C
Minimum functional pressure for interruption	- MPa	abs. at 20 °C
Insulating medium	Air	
Rated filling pressure for insulation	- MPa	abs. at 20 °C
Minimum functional pressure for insulation	- MPa	abs. at 20 °C
Driving mechanism (type)	Spring, charged by motor	
Number of poles	3	
Number of units per pole	1	
Rated opening time	< 60 ms	
Rated closing time	< 60 ms	
Rated supply voltage of opening device	110 V	d.c.
Rated supply voltage of closing device	110 V	d.c.
Rated supply voltage of auxiliary circuits	110 V	d.c.
Rated frequency of supply voltage	- Hz	
Rated line /cable-charging breaking current	10 / 31.5 A	
Rated single capacitor bank breaking current	400 A	
Classification of circuit-breaker	Class M2, E2, C2, S1	

Further data:

Serial number of vacuum interrupter in pole L1 / L2 / L3	S 990122 / S 000147 / S 000152
Pole centre distance	210 mm
Width across flats	310 mm

Essential characteristics:

-

ВЯРНО С ОРИГИНАЛА

Prüffeld der Schaltwerke
Berlin

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-11055-10-01

Test Document

Report No.: 15-055-MS **Copy No.:** 0 **Contents:** 46 Sheets

Test object: Three-pole vacuum circuit-breaker

Designation: 3AE5324-2 with vacuum interrupters VSS12-1-31-A5
Rated voltage: 24 kV Rated normal current: 1250 A Rated frequency: 50/60 Hz
Rated short-circuit breaking current: 25 kA

Manufacturer: Siemens AG, EM MS O SD BLN MF, Berlin

Client: Siemens AG, EM MS R&D OC, Berlin

Testing station: Prüffeld der Schaltwerke, Berlin

Date of test: August 18 - 20, 2015

Applied test specifications:

IEC 62271-1, Edition 1.1, 2011-08
IEC 62271-100, Edition 2.1, 2012-09

Tests performed:

Short-circuit tests for a rated current of 25 kA at a rated voltage of 24 kV and a rated frequency of 50 Hz in test-duty:

STC: Short-time withstand current: 25 kA - 3 s; peak withstand current: 65 kA

Test results:

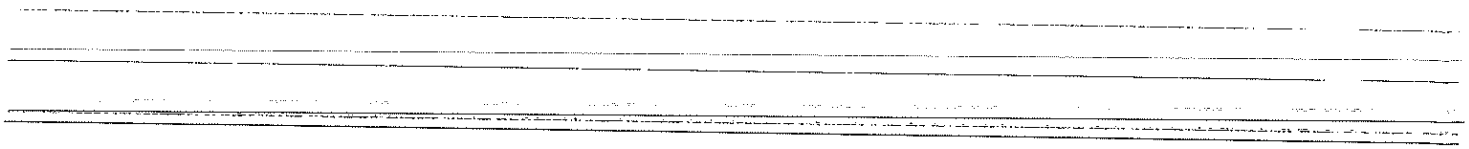
The test object has passed the above indicated tests without any objection. The proved performance and the results obtained comply with the requirements mentioned above.

Prüffeld der Schaltwerke Berlin Bereich Mittelspannung

На основание чл.36а ал.3 от ЗОП

Head of Hi

Berlin, October 05, 2015



Documents and Addresses

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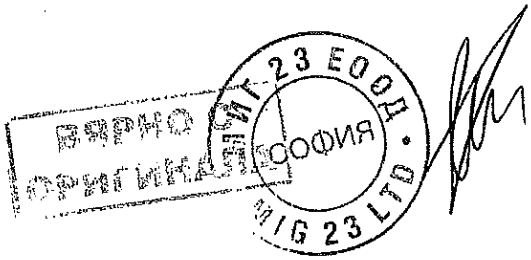

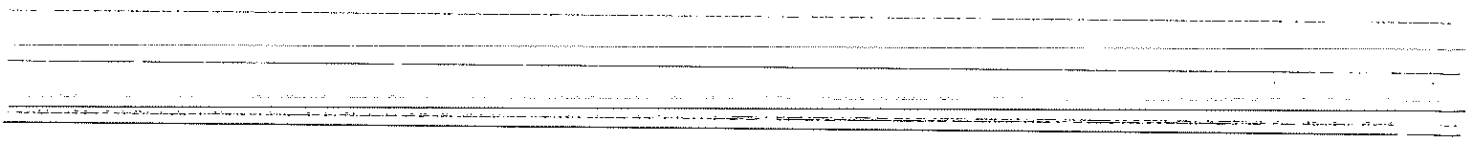

Technical Data of Test Object
Circuit-Breaker

Test object:	Three-pole vacuum circuit-breaker
Designation:	3AE5324-2 with vacuum interrupters VSS12-1-31-A5
Manufacturer:	Siemens AG, EM MS O SD BLN MF, Berlin
Serial No.:	S 3AE5/00004949
Year of manufacture:	2015
Drawing No.:	Drawings and parts lists - see sheet 6

Ratings assigned by the manufacturer:

Rated voltage	24	kV	
Rated normal current	1250	A	
Rated frequency	50/60	Hz	
Rated lightning impulse withstand voltage	125	kV	
Rated switching impulse withstand voltage	-	kV	
Rated power-frequency withstand voltage	65	kV	
Rated peak withstand current	65	kA	
Rated short-time withstand current	25	kA	
Rated duration of short-circuit	3	s	
Rated short-circuit breaking current	25	kA	
DC component of the rated short-circuit breaking current (Valid for a minimum opening time of 21 ms, a relay-time of 10 ms and a time constant of 45 ms)	50	%	
Rated short-circuit making current	65	kA	
Rated transient recovery voltage	41.2	kV	
Rate of rise of transient recovery voltage	0.47	kV/µs	
First-pole-to-clear factor	1.5		
Rated operating sequence	O - 0.3 s - CO - 15 s - CO		
Arc extinguishing medium	Vacuum		
Rated filling pressure for interruption	-	MPa	abs. at 20 °C
Minimum functional pressure for interruption	-	MPa	abs. at 20 °C
Insulating medium	Air		
Rated filling pressure for insulation	-	MPa	abs. at 20 °C
Minimum functional pressure for insulation	-	MPa	abs. at 20 °C
Driving mechanism (type)	Spring, charged by motor		
Number of poles	3		
Number of units per pole	1		
Rated opening time	< 60	ms	
Rated closing time	< 60	ms	
Rated supply voltage of opening device	110	V	d.c.
Rated supply voltage of closing device	110	V	d.c.
Rated supply voltage of auxiliary circuits	110	V	d.c.
Rated frequency of supply voltage	-	Hz	
Rated line /cable-charging breaking current	10 / 31.5	A	
Rated single capacitor bank breaking current	400	A	
Classification of circuit-breaker	Class M2, E2, C2, S1		

Further data:

Serial number of vacuum interrupter in pole L1 / L2 / L3	S 990122 / S 000147 / S 000152
Pole centre distance	210 mm
Width across flats	310 mm

Essential characteristics:

-

ВЯРНО С ОРИГИНАЛА

ИНТ 23 ЕООД СОФИЯ MIG 23 LTD

Prüffeld der Schaltwerke Berlin

DAkkS
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D-PL-11055-10-01

Test Document

Report No.: 15-070-MH **Copy No.:** 0 **Contents:** 19 **Sheets**

Test object: Three-pole vacuum circuit-breaker

Designation: 3AE5324-2 with vacuum interrupters VSS12-1-31-A5
Rated voltage: 24 kV Rated normal current: 1250 A Rated frequency: 50/60 Hz
Rated short-circuit breaking current: 25 kA

Manufacturer: Siemens AG, EM MS O SD BLN MF, Berlin

Client: Siemens AG, EM MS R&D OC, Berlin

Testing station: Prüffeld der Schaltwerke, Berlin

Date of test: August 19, 2015

Applied test specifications:

IEC 62271-1, Edition 1.1, 2011-08
DIN EN 62271-1/A1 (VDE 0671-1/A1), 2012-04
IEC 62271-100, Edition 2.1, 2012-09
DIN EN 62271-100 (VDE 0671-100), 2013-08

Tests performed:

Dielectric tests, including:
Lightning impulse withstand voltage: 125 kV
Short-duration power-frequency withstand voltage: 50 kV

Test results:

The test object has passed the above indicated tests without any objection. The proved performance and the results obtained comply with the requirements mentioned above.

Prüffeld der Schaltwerke Berlin PSW

На основание чл.36а ал.3 от ЗОП

Hea

Berlin, October 08, 2015
Rev.: June 29, 2016

02DE1310

Documents and Addresses

Accreditation

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Addresses

Testing Station:	Prüffeld der Schaltwerke, Berlin Siemens AG EM MS R&D OC TD Nonnendammallee 104 13629 Berlin Germany
Manufacturer:	Siemens AG EM MS O SD BLN MF Nonnendammallee 104 13629 Berlin Germany
Client:	Siemens AG EM MS R&D OC Nonnendammallee 104 13629 Berlin Germany

ВЯРНО С ОРИГИНАЛА

MIG 23 ЕООД СОФИЯ MIG 23 LTD

Technical Data of Test Object
Circuit-Breaker

Test object:	Three-pole vacuum circuit-breaker
Designation:	3AE5324-2 with vacuum interrupters VSS12-1-31-A5
Manufacturer:	Siemens AG, EM MS O SD BLN MF, Berlin
Serial No.:	S3AE5/00004953
Year of manufacture:	2015
Drawing No.:	Drawings and parts lists - see sheet 6

Ratings assigned by the manufacturer:

Rated voltage	24 kV	
Rated normal current	1250 A	
Rated frequency	50/60 Hz	
Rated lightning impulse withstand voltage	125 kV	
Rated switching impulse withstand voltage	- kV	
Rated power-frequency withstand voltage	50 kV	
Rated peak withstand current	65 kA	
Rated short-time withstand current	25 kA	
Rated duration of short-circuit	3 s	
Rated short-circuit breaking current	25 kA	
DC component of the rated short-circuit breaking current (Valid for a minimum opening time of 21 ms, a relay-time of 10 ms and a time constant of 45 ms)	50 %	
Rated short-circuit making current	65 kA	
Rated transient recovery voltage	41.2 kV	
Rate of rise of transient recovery voltage	0.47 kV/µs	
First-pole-to-clear factor	1.5	
Rated operating sequence	O - 0.3 s - CO - 15 min - CO	
Arc extinguishing medium	Vacuum	
Rated filling pressure for interruption	- MPa	abs. at 20 °C
Minimum functional pressure for interruption	- MPa	abs. at 20 °C
Insulating medium	Air	
Rated filling pressure for insulation	- MPa	abs. at 20 °C
Minimum functional pressure for insulation	- MPa	abs. at 20 °C
Driving mechanism (type)	Spring, charged by motor	
Number of poles	3	
Number of units per pole	1	
Rated opening time	< 60 ms	
Rated closing time	< 60 ms	
Rated supply voltage of opening device	110 V	d.c.
Rated supply voltage of closing device	110 V	d.c.
Rated supply voltage of auxiliary circuits	110 V	d.c.
Rated frequency of supply voltage	- Hz	
Rated line /cable-charging breaking current	10/ 31.5 A	
Rated single capacitor bank breaking current	400 A	
Classification of circuit-breaker	Class M2, E2, C2, S1	

Further data:

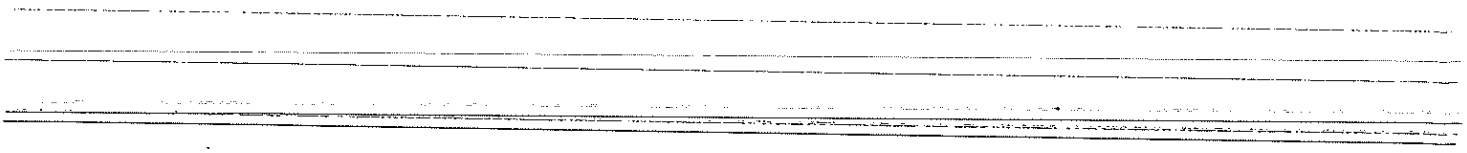
Serial number of vacuum interrupter in pole L1 / L2 / L3	S000132 / S000151 / S990114
Pole centre distance	210 mm
Width across flats	310 mm

Essential characteristics:

-

ВЯРНО С ОРИГИНАЛА

BG 23 EOOД СОФИЯ BG 23 LTD



Prüffeld der Schaltwerke
Berlin

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-11055-10-01

Test Document

Report No.: 15-072-MM **Copy No.:** 0 **Contents:** 19 **Sheets**

Test object: Three-pole vacuum circuit-breaker

Designation: 3AE5354-2 with vacuum interrupters VSS12-1-31-A5
Rated voltage: 24 kV Rated normal current: 1250 A Rated frequency: 50/60 Hz
Rated short-circuit breaking current: 25 kA

Manufacturer: Siemens AG, EM MS O SD BLN MF, Berlin

Client: Siemens AG, EM MS R&D OC, Berlin

Testing station: Prüffeld der Schaltwerke, Berlin

Date of test: August 18 - September 11, 2015

Applied test specifications:

IEC 62271-1, Edition 1.1, 2011-08
IEC 62271-100, Edition 2.1, 2012-09
IEC 60068-2-1, Edition 6.0, 2007-03
IEC 60068-2-2, Edition 5.0, 2007-07

DIN EN 62271-1/A1 (VDE 0671-1/A1), 2012-04
DIN EN 62271-100 (VDE 0671-100), 2013-08
DIN EN 60068-2-1 (VDE 0468-2-1), 2008-01
DIN EN 60068-2-2 (VDE 0468-2-2), 2008-01

Tests performed:

- Low and high temperature Test (-25°C/+40°C)
- Voltage Test as a Condition Check

Test results:

The test object has passed the above indicated tests without any objection. The proved performance and the results obtained comply with the requirements mentioned above.

Prüffeld der Schaltwerke Berlin Bereich Mittelspannung

На основание чл.36а ал.3 от ЗОП

Berlin, October 09, 2015

The test results relate only to the items tested.
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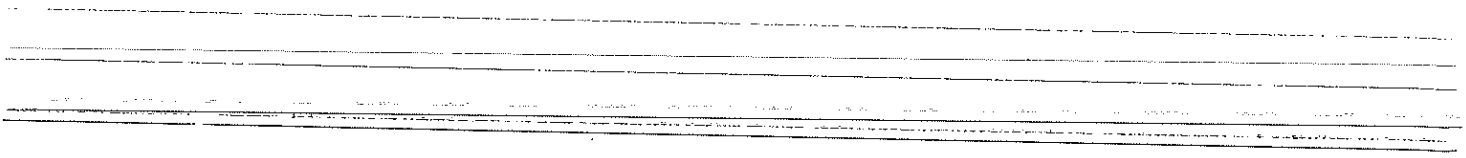
MIG 23 LTD



Documents and Addresses

Accreditation

The Prüffeld der Schaltwerke, Berlin has been approved by the DAkkS (German accreditation body) according to EN ISO/IEC 17025 for tests in the field of high-voltage switchgear and controlgear and power engineering equipment (Registration-No D-PL-11055-10-01).

Under reference to EN ISO/IEC 17025 the Prüffeld der Schaltwerke states the following:

- The accreditation of the Prüffeld der Schaltwerke or any of its test reports by themselves in no way constitute or imply product approval by DAkkS or any other body.
- If someone refers to a test in an accredited Prüffeld der Schaltwerke this reference shall include the accreditation body, i.e. DAkkS, the relevant scope of the accreditation and the appropriate registration number.

PSW-Documents

A Certificate

is issued for type tests which have successfully been carried out in full compliance with the relevant specifications or standards valid at the time of the test. For these tests the equipment under test must be clearly identified by technical description, drawings and additional specifications.

A Test Document

is issued for parts of type tests which have successfully been carried out in full compliance with the relevant specifications or standards valid at the time of test. For these tests the equipment under test must be clearly identified by technical description, drawings and additional specifications.

A Test Report

is issued for all other tests which have been carried out according to specifications, standards and/or clients instructions. Similarly, this test report contains all test results, details of the conditions under which the tests were carried out, also details relating to the behaviour of the equipment during test, and its condition after the tests.

A Test Confirmation

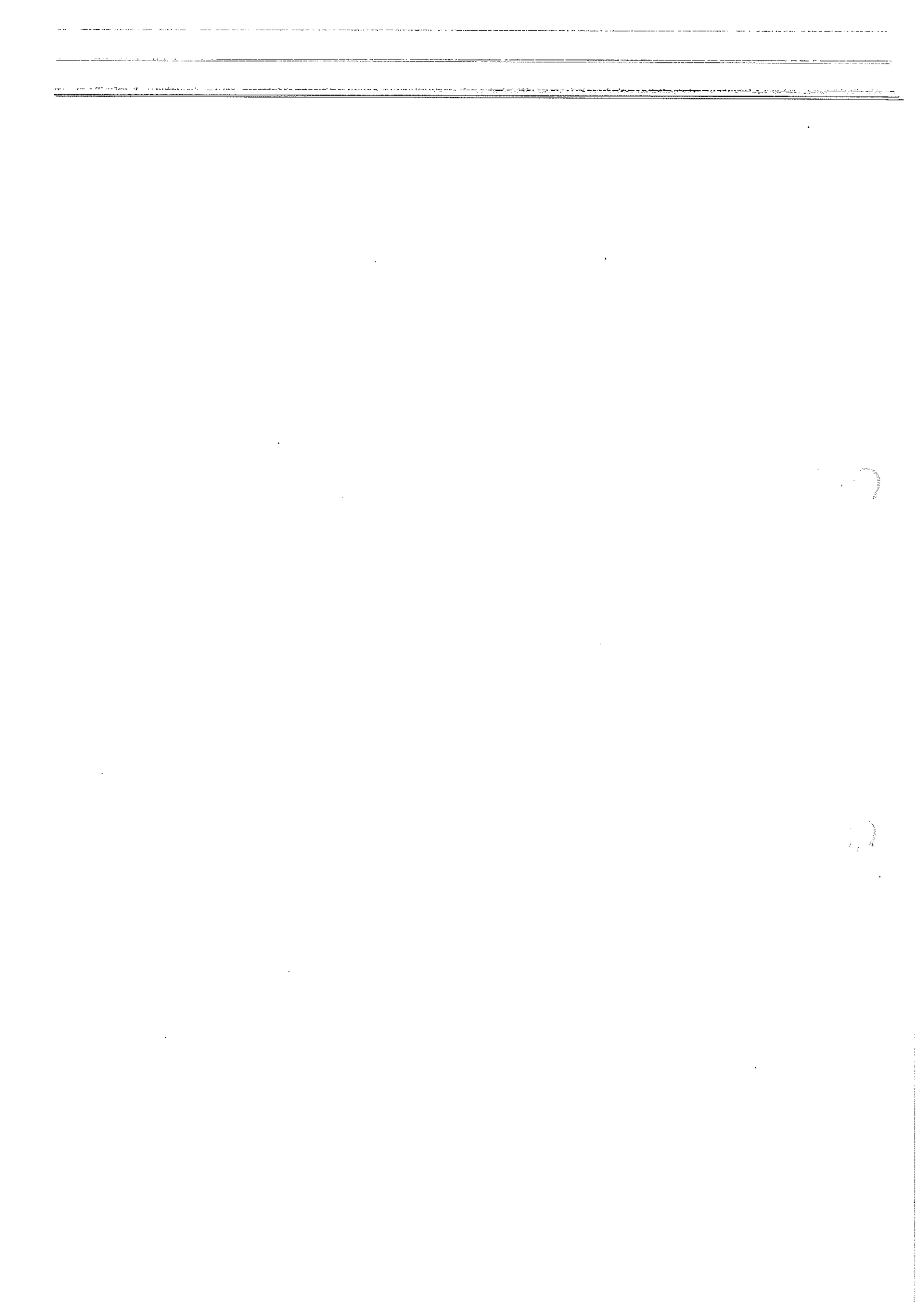
is issued immediately after the tests. It confirms that the tests have been conducted and is valid only until publishing the detailed results in an entire document.

Addresses

Testing Station: Prüffeld der Schaltwerke, Berlin
Siemens AG
EM MS R&D OC TD
Nonnendammallee 104
13629 Berlin
Germany

Manufacturer: Siemens AG
EM MS O SD BLN MF
Nonnendammallee 104
13629 Berlin
Germany

Client: Siemens AG
EM MS R&D OC
Nonnendammallee 104
13629 Berlin
Germany



Technical Data of Test Object
Circuit-Breaker

Test object:	Three-pole vacuum circuit-breaker
Designation:	3AE5354-2 with vacuum interrupters VSS12-1-31-A5
Manufacturer:	Siemens AG, EM MS O SD BLN MF, Berlin
Serial No.:	S3AE5/00004954
Year of manufacture:	2015
Drawing No.:	Drawings and parts lists - see sheet 6

Ratings assigned by the manufacturer:

Rated voltage	24 kV	
Rated normal current	1250 A	
Rated frequency	50/60 Hz	
Rated lightning impulse withstand voltage	125 kV	
Rated switching impulse withstand voltage	- kV	
Rated power-frequency withstand voltage	50 kV	
Rated peak withstand current	63/65 kA	
Rated short-time withstand current	25 kA	
Rated duration of short-circuit	3 s	
Rated short-circuit breaking current	25 kA	
DC component of the rated short-circuit breaking current	50 %	
(Valid for a minimum opening time of 21 ms, a relay-time of 10 ms and a time constant of 45 ms)		
Rated short-circuit making current	63/65 kA	
Rated transient recovery voltage	41.2 kV	
Rate of rise of transient recovery voltage	0.47 kV/µs	
First-pole-to-clear factor	1.5	
Rated operating sequence	O - 0.3s - CO - 15s - CO	
Arc extinguishing medium	Vacuum	
Rated filling pressure for interruption	- MPa	abs. at 20 °C
Minimum functional pressure for interruption	- MPa	abs. at 20 °C
Insulating medium	Air	
Rated filling pressure for insulation	- MPa	abs. at 20 °C
Minimum functional pressure for insulation	- MPa	abs. at 20 °C
Driving mechanism (type)	Spring, charged by motor	
Number of poles	3	
Number of units per pole	1	
Rated opening time	< 60 ms	
Rated closing time	< 60 ms	
Rated supply voltage of opening device	110 V	d.c.
Rated supply voltage of closing device	110 V	d.c.
Rated supply voltage of auxiliary circuits	110 V	d.c.
Rated frequency of supply voltage	- Hz	
Rated line /cable-charging breaking current	- / 31.5 A	
Rated single capacitor bank breaking current	400 A	
Classification of circuit-breaker	Class M2, E2, C2, S1	

Further data:

Serial number of vacuum interrupter in pole L1 / L2 / L3	S 000155 / S 000109 / S 000106
Pole centre distance	275 mm
Width across flats	310 mm

Essential characteristics:

-

ВЯРНО С ОРИГИНАЛА

МИГ 23 ЕООД СОФИЯ MIG 23 LTD

Prüffeld der Schaltwerke
Berlin

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-11055-10-01

Test Document

Report No.: 15-073-MM **Copy No.:** 0 **Contents:** 24 **Sheets**

Test object: Three-pole vacuum circuit-breaker

Designation: 3AE5354-2 with vacuum interrupters VSS12-1-31-A5
Rated voltage: 24 kV Rated normal current: 1250 A Rated frequency: 50/60 Hz
Rated short-circuit breaking current: 25 kA

Manufacturer: Siemens AG, EM MS O SD BLN MF, Berlin

Client: Siemens AG, EM MS R&D OC, Berlin

Testing station: Prüffeld der Schaltwerke, Berlin

Date of test: August 26 - September 11, 2015

Applied test specifications:

IEC 62271-1, Edition 1.1, 2011-08
IEC 62271-100, Edition 2.1, 2012-09
DIN EN 62271-1/A1 (VDE 0671-1/A1), 2012-04
DIN EN 62271-100 (VDE 0671-100), 2013-08

Tests performed:

- Extended mechanical endurance test (M2, 10 000 operation cycles)
- Voltage Test as a Condition Check

Test results:

The test object has passed the above indicated tests without any objection. The proved performance and the results obtained comply with the requirements mentioned above.

Prüffeld der Schaltwerke Berlin Bereich Mittelspannung

На основание чл.36а ал.3 от ЗОП

Berlin, October 09, 2015

The test results relate only to the items tested.

02DE1310

ОРИГИНАЛА

СОФИЯ

Documents and Addresses

Accreditation

The Prüffeld der Schaltwerke, Berlin has been approved by the DAkkS (German accreditation body) according to EN ISO/IEC 17025 for tests in the field of high-voltage switchgear and controlgear and power engineering equipment (Registration-No D-PL-11055-10-01).

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PSW-Documents

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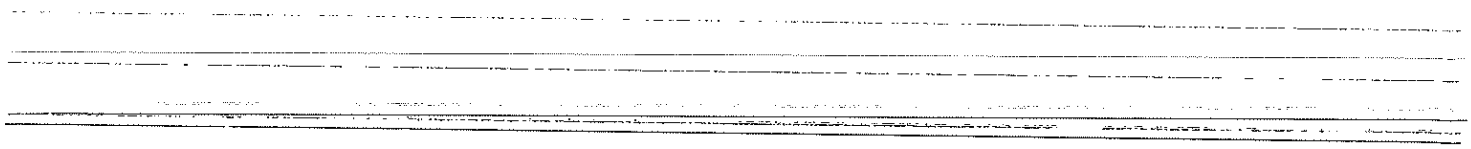
A Test Confirmation

is issued immediately after the tests. It confirms that the tests have been conducted and is valid only until publishing the detailed results in an entire document.

Addresses

Testing Station:	Prüffeld der Schaltwerke, Berlin Siemens AG EM MS R&D OC TD Nonnendammallee 104 13629 Berlin Germany
Manufacturer:	Siemens AG EM MS O SD BLN MF Nonnendammallee 104 13629 Berlin Germany
Client:	Siemens AG EM MS R&D OC Nonnendammallee 104 13629 Berlin Germany



Technical Data of Test Object
Circuit-Breaker

Test object:	Three-pole vacuum circuit-breaker
Designation:	3AE5354-2 with vacuum interrupters VSS12-1-31-A5
Manufacturer:	Siemens AG, EM MS O SD BLN MF, Berlin
Serial No.:	S3AE5/00004954
Year of manufacture:	2015
Drawing No.:	Drawings and parts lists - see sheet 6

Ratings assigned by the manufacturer:

Rated voltage	24	kV	
Rated normal current	1250	A	
Rated frequency	50/60	Hz	
Rated lightning impulse withstand voltage	125	kV	
Rated switching impulse withstand voltage	-	kV	
Rated power-frequency withstand voltage	50	kV	
Rated peak withstand current	63/65	kA	
Rated short-time withstand current	25	kA	
Rated duration of short-circuit	3	s	
Rated short-circuit breaking current	25	kA	
DC component of the rated short-circuit breaking current	50	%	
(Valid for a minimum opening time of 21 ms, a relay-time of 10 ms and a time constant of 45 ms)			
Rated short-circuit making current	63/65	kA	
Rated transient recovery voltage	41.2	kV	
Rate of rise of transient recovery voltage	0.47	kV/µs	
First-pole-to-clear factor	1.5		
Rated operating sequence	O - 0.3s - CO - 15s - CO		
Arc extinguishing medium	Vacuum		
Rated filling pressure for interruption	-	MPa	abs. at 20 °C
Minimum functional pressure for interruption	-	MPa	abs. at 20 °C
Insulating medium	Air		
Rated filling pressure for insulation	-	MPa	abs. at 20 °C
Minimum functional pressure for insulation	-	MPa	abs. at 20 °C
Driving mechanism (type)	Spring, charged by motor		
Number of poles	3		
Number of units per pole	1		
Rated opening time	< 60	ms	
Rated closing time	< 60	ms	
Rated supply voltage of opening device	110	V	d.c.
Rated supply voltage of closing device	110	V	d.c.
Rated supply voltage of auxiliary circuits	110	V	d.c.
Rated frequency of supply voltage	-	Hz	
Rated line /cable-charging breaking current	- / 31.5	A	
Rated single capacitor bank breaking current	400	A	
Classification of circuit-breaker	Class M2, E2, C2, S1		

Further data:

Serial number of vacuum interrupter in pole L1 / L2 / L3	S 000155 / S 000109 / S 000106
Pole centre distance	275 mm
Width across flats	310 mm

Essential characteristics:

-

ВЯРНО С ОРИГИНАЛА

MIG 23 ЕООД СОФИЯ MIG 23 LTD

Prüffeld der Schaltwerke
Berlin

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-11055-10-01

Test Document

Report No.: 15-075-ME **Copy No.:** 0 **Contents:** 18 Sheets

Test object: Three-pole vacuum circuit-breaker

Designation: 3AE5324-2 with vacuum interrupters VSA 12-1-31 A5
Rated voltage: 24 kV Rated normal current: 1250 A Rated frequency: 50/60 Hz
Rated short-circuit breaking current: 25 kA

Manufacturer: Siemens AG, EM MS O SD BLN MF, Berlin

Client: Siemens AG, EM MS R&D OC 4 2, Berlin

Testing station: Prüffeld der Schaltwerke, Berlin

Date of test: August 26th - September 01th, 2015

Applied test specifications:

IEC 62271-1, Edition 1.1, 2011-08
IEC 62271-100, Edition 2.1, 2012-09
DIN EN 62271-1/A1 (VDE 0671-1/A1), 2012-04
DIN EN 62271-100 (VDE 0671-100), 2013-08

Tests performed:

Temperature-rise test with 1250 A at 50 Hz
(Terminal connection: copper bar, painted, 60mm x 10mm)

Test results:

The test object has passed the above indicated tests without any objection. The proved performance and the results obtained comply with the requirements mentioned above.

Prüffeld der Schaltwerke Berlin Bereich Mittelspannung

На основание чл.36а ал.3 от ЗОП

Berlin, November 05, 2015

02DE1310

Documents and Addresses

Accreditation

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PSW-Documents

A Type Test Certificate

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Siemens AG
EM MS R&D OC TD
Nonnendammallee 104
13629 Berlin
Germany

Manufacturer: Siemens AG
EM MS O SD BLN MF
Nonnendammallee 104
13629 Berlin
Germany

Client: Siemens AG
EM MS R&D OC
Nonnendammallee 104
13629 Berlin
Germany

ВЯРНО С ОРИГИНАЛА

СОФИЯ

Technical Data of Test Object
Circuit-Breaker

Test object:	Three-pole vacuum circuit-breaker
Designation:	3AE5324-2 with vacuum interrupters VSS12-1-31-A5
Manufacturer:	Siemens AG, EM MS O SD BLN MF, Berlin
Serial No.:	3AE5/00004952
Year of manufacture:	2015
Drawing No.:	Drawings and parts lists - see sheet 6 and 7

Ratings assigned by the manufacturer:

Rated voltage	24 kV	
Rated normal current	1250 A	
Rated frequency	50/60 Hz	
Rated lightning impulse withstand voltage	125 kV	
Rated switching impulse withstand voltage	- kV	
Rated power-frequency withstand voltage	65 kV	
Rated peak withstand current	65 kA	
Rated short-time withstand current	25 kA	
Rated duration of short-circuit	3 s	
Rated short-circuit breaking current	25 kA	
DC component of the rated short-circuit breaking current (Valid for a minimum opening time of 21 ms, a relay-time of 10 ms and a time constant of 45 ms)	50 %	
Rated short-circuit making current	65 kA	
Rated transient recovery voltage	41.2 kV	
Rate of rise of transient recovery voltage	0.47 kV/µs	
First-pole-to-clear factor	1.5	
Rated operating sequence	O - 0.3 s - CO - 3 min - CO	
Arc extinguishing medium	Vacuum	
Rated filling pressure for interruption	- MPa	abs. at 20 °C
Minimum functional pressure for interruption	- MPa	abs. at 20 °C
Insulating medium	Air	
Rated filling pressure for insulation	- MPa	abs. at 20 °C
Minimum functional pressure for insulation	- MPa	abs. at 20 °C
Driving mechanism (type)	Spring, charged by motor	
Number of poles	3	
Number of units per pole	1	
Rated opening time	< 60 ms	
Rated closing time	< 60 ms	
Rated supply voltage of opening device	110 V	d.c.
Rated supply voltage of closing device	110 V	d.c.
Rated supply voltage of auxiliary circuits	110 V	d.c.
Rated frequency of supply voltage	- Hz	
Rated line /cable-charging breaking current	10 / 31.5 A	
Rated single capacitor bank breaking current	400 A	
Classification of circuit-breaker	Class M2, E2, C2, S1	

Further data:

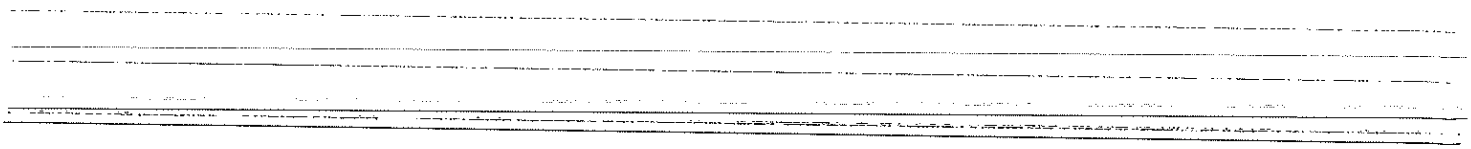
Serial number of vacuum interrupter in pole L1 / L2 / L3	S000197 /S000158 / S000149
Pole centre distance	210 mm
Width across flats	310 mm

Essential characteristics:

-

ВЯРНО С ОРИГИНАЛА

МГ 23 ЕООД СОФИЯ MG 23 LTD



SIEMENS

Energy Management
SOT 11628c

Summary of type tests for Vacuum Circuit-Breaker 3AE5353-1 (24 kV, 20 kA, 800 A)

The vacuum circuit-breakers of type 3AE5 were type tested in accordance with

IEC Publication 62271-1, Edition 1.1, 2011-08,
IEC Publication 62271-100, Edition 2.1, 2012-09 and the relevant harmonisation documents.

For vacuum circuit-breaker 3AE5353-1 the following test documents are valid:

Type Tests	Rated Values	Test Documents
Dielectric tests	U_P = 125 kV U_d = 50 kV	15-070-MH
Temperature-rise tests	I_r = 800 A	15-075-ME
Mechanical operation test at ambient temperature, Low and high temperature tests	10.000 op. Cycles -25 / 40 °C	15-073-MM 15-072-MM
Short-time withstand current and peak withstand current tests	I_{sc} = 20 kA/3s I_{ma} = 50 kA	15-055-MS
Short-circuit making and breaking tests	I_{sc} = 20 kA I_{ma} = 50 kA	15-054-MS-1

Siemens Aktiengesellschafft

Postfach 13623 SIEMENS AG D-13626 Berlin Germany EM MS O SD GF D

sgd. Mr. Blöbaum
EM MS O SD GF D

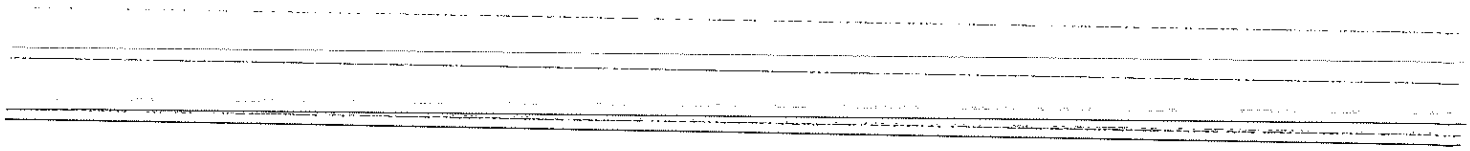
sgd. Dr. Heinrich
EM LP PRM MV

Berlin, July 11, 2017

Siemens AG
Energy Management Division; Leitung: Ralf Christian
Medium Voltage & Systems; Leitung: Stephan May

Nonnendammallee 104
13629 Berlin
Deutschland

Tel.: +49 (30) 386 0



SIEMENS

Energy Management

SOT 11628c

Summary of type tests for Vacuum Circuit-Breaker 3AE5353-1 (24 kV, 20 kA, 800 A)

If a test is carried out with a vacuum circuit-breaker with different order number, the validity of the test document is given by the following statements:

The listed test documents for the mentioned vacuum circuit-breaker are valid in respect to familiar design of the vacuum circuit-breakers, as the construction of the main current path and mechanical driving mechanism is nearly identical.

Siemens Aktiengesellschafft

Postfach 13623 SIEMENS AG D-13626 Berlin Germany EM MS O SD GF D

sgd. Mr. Blöbaum
EM MS O SD GF D

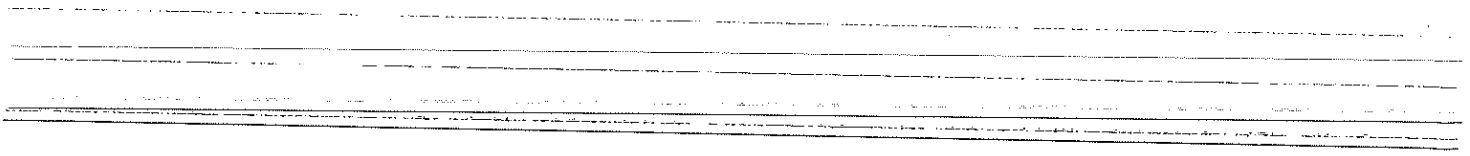
sgd. Dr. Heinrich
EM LP PRM MV

Berlin, July 11, 2017

Siemens AG
Energy Management Division; Leitung: Ralf Christian
Medium Voltage & Systems; Leitung: Stephan May

Nonnendammallee 104
13629 Berlin
Deutschland

Tel.: +49 (30) 386 0



SIEMENS

Energy Management

SOT 11628c

Summary of type tests for Vacuum Circuit-Breaker 3AE5353-1 (24 kV, 20 kA, 800 A)

In addition to the type tests in accordance with IEC 62271-1 and IEC 62271-100 the following tests were carried out:

Type Tests	Test Documents
Single-phase and double earth fault tests	15-054-MS-1
Capacitive current switching tests: - cable-charging current breaking tests - line-charging current breaking tests - single capacitor bank switching tests	15-065-MS
Out-of-phase making and breaking tests	16-085-MS
Electrical endurance test on class E2	15-096-MS

Siemens Aktiengesellschafft

EM MS O SD GF D Postfach 13623 SIEMENS AG D-13623 Berlin Germany

sgd. Mr. Blöbaum
EM MS O SD GF D

sgd. Dr. Heinrich
EM LP PRM MV

Berlin, July 11, 2017

Siemens AG
Energy Management Division; Leitung: Ralf Christian
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13629 Berlin
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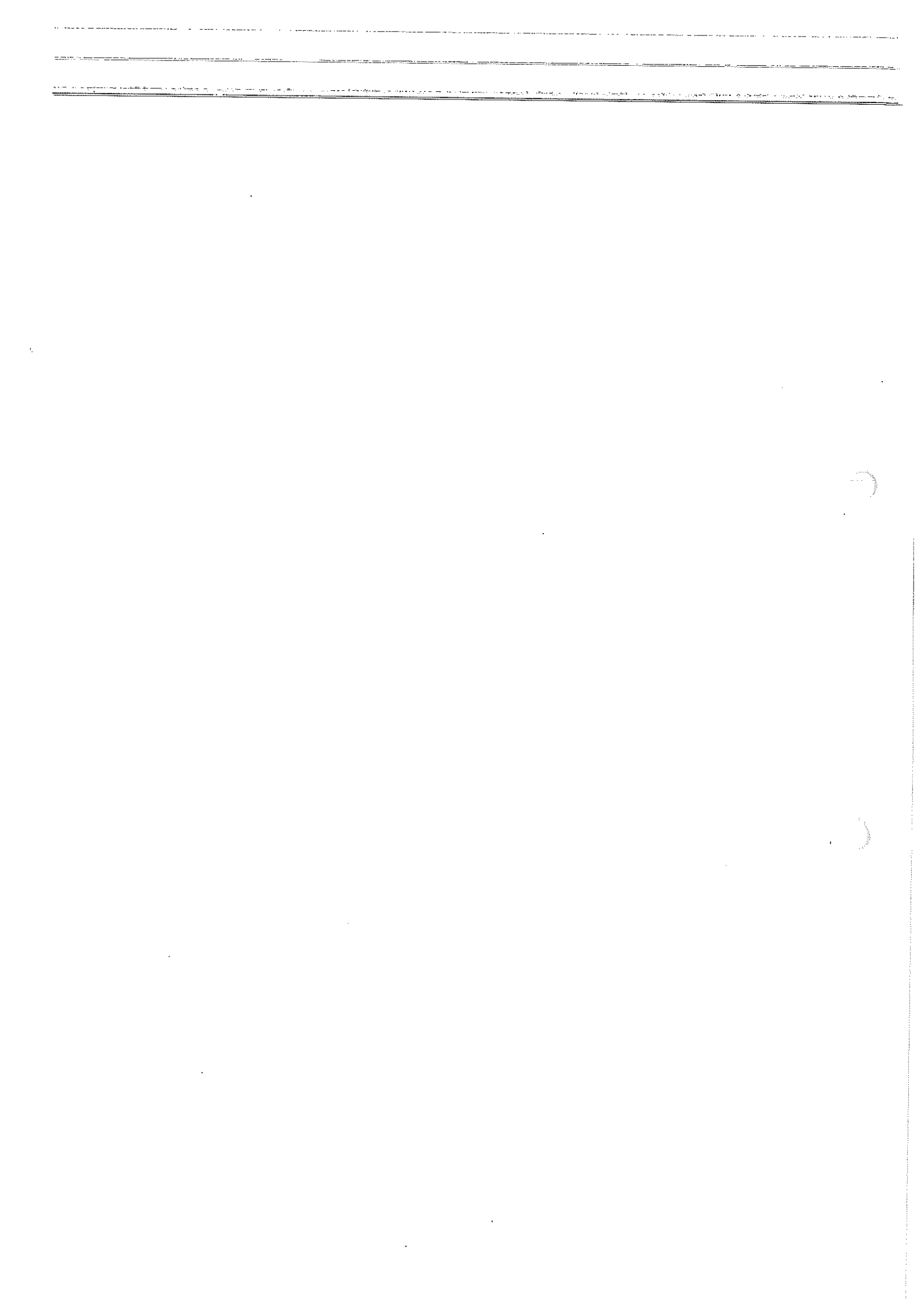
Tel.: +49 (30) 386 0



SIEMENS

Енергиен мениджмънт

SOT 11628c

Тестов документ
за вакуумен мощностен прекъсвач 3AE5353-1
(24kV, 20kA, 800A)

вакуумен мощностен прекъсвач 3AE е типово тестван в съответствие с

IEC 62271-1 версия 1.1,2011-08
IEC 62271-100, версия 2.1, 2012-09 и съответните хармонизиращи документи

за вакуумен мощностен прекъсвач 3AE5353-1 долупосочените тестове са валидни

Изпитания	Стойност	Документ
Диелектрични изпитание на изолацията	U_p = 125kV U_d = 50kV	15-070-MH
Изпитание за температурна устойчивост	I_r= 800 A	15-075-ME
Изпитания за механична устойчивост при температура на околната среда, ниска и висока температура	10.000 Цикъла -25/ +55 °C	15-073-MM 17-086-MM
Изпитания за устойчивост на върхов и ток на късо съединение	I_{sc} =20kA/3s I_{ma} =50kA	15-055-MS
Изпитания за термична и динамична устойчивост	I_{sc} =20kA I_{ma} =50kA	15-054-MS-1

Блоебаум */подпис, не се чете/*

EM MS O SD GF D

Хайнрих */подпис, не се чете/*

EM LP PRM MV

Берлин, 11 Юли 2017

Siemens AG
Направление Енергиен Мениджмънт; Мениджър: Ралф Кристиан
Средно напрежение & Системи; Мениджър: Стефан Мей

Нонендамеле 104
13629 Берлин
Германия

Тел. +49 (30) 386 0

ВЯРНО С ОРИГИНАЛА

MIG 23 LTD. СОФИЯ

SIEMENS

Енергиен мениджмънт

SOT 11628c

Тестов документ
за вакуумен мощностен прекъсвач 3AE5353-1
(24kV, 20kA, 800A)

Ако се провежда изпитване с вакуумен прекъсвач с различен поръчков номер, валидността на документа за изпитване се дава чрез следните изявления:

Изброените тестови документи за посочения вакуумен прекъсвач са валидни поради сходен дизайн на вакуумните прекъсвачи и предвид, че конструкцията на пътя на основния ток и механичният задвижващ механизъм са почти еднакви.

Блоебаум */подпис, не се чете/*

EM MS O SD GF D

Берлин, 11 Юли 2017

Хайнрих */подпис, не се чете/*

EM LP PRM MV

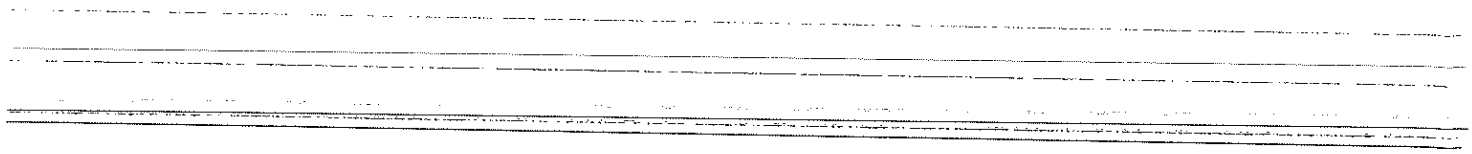
Siemens AG
Направление Енергиен Мениджмънт; Мениджър: Ралф Кристиан
Средно напрежение & Системи; Мениджър: Стефан Мей

Нонендамеле 104
13629 Берлин
Германия

Тел. +49 (30) 386 0

ВЯРНО С ОРИГИНАЛА

ВИТ 23 ЕООД София



SIEMENS

Енергиен мениджмънт

SOT 11628c

Тестов документ
за вакуумен мощностен прекъсвач 3AE5353-1
(24kV, 20kA, 800A)

В допълнение към типовите изпитания в съответствие с IEC 62271-1 и IEC 62271-100 са извършени следните тестове:

Изпитания	Документ
Изпитания за еднофазно и двуфазно земно късо съединение	15-054-MS-1
Изпитания с капацитивен ток	15-065-MS
Изпитания за термична и динамична устойчивост без фаза	16-085-MS
Тест за електрическа устойчивост, клас E2	15-096-MS

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EM MS O SD GF D

Берлин, 11 Юли 2017

Хайнрих */подпис, не се чете/*

EM LP PRM MV

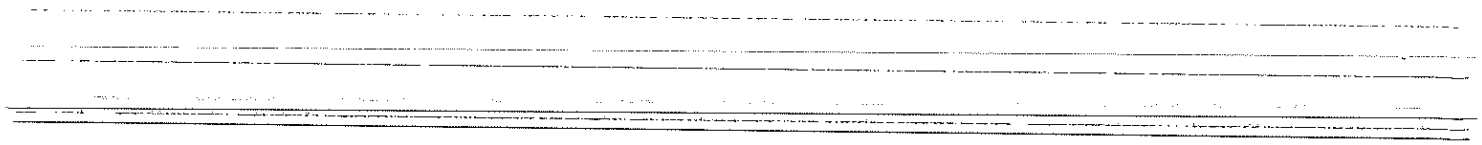
Siemens AG
Направление Енергиен Мениджмънт; Мениджър: Ралф Кристиан
Средно напрежение & Системи; Мениджър: Стефан Мей

Нонендамеле 104
13629 Берлин
Германия

Тел. +49 (30) 386 0

ВЯРНО С ОРИГИНАЛА

ВИГ 23 ЕООД СОФИЯ MIG 23 LTD



SIEMENS

Energy Management

SOT 11631d

Summary of type tests for Vacuum Circuit-Breaker 3AE5353-2 (24 kV, 20 kA, 1250 A)

The vacuum circuit-breakers of type 3AE5 were type tested in accordance with

IEC Publication 62271-1, Edition 1.1, 2011-08,
IEC Publication 62271-100, Edition 2.1, 2012-09 and the relevant harmonisation documents.

For vacuum circuit-breaker 3AE5353-2 the following test documents are valid:

Type Tests	Rated Values	Test Documents
Dielectric tests	U_P = 125 kV U_d = 50 kV	15-070-MH
Temperature-rise tests	I_r = 1250 A	15-075-ME
Mechanical operation test at ambient temperature, Low and high temperature tests	10.000 op. Cycles -25 / 55 °C	15-073-MM 17-086-MM
Short-time withstand current and peak withstand current tests	I_{sc} = 20 kA/3s I_{ma} = 50 kA	15-055-MS
Short-circuit making and breaking tests	I_{sc} = 20 kA I_{ma} = 50 kA	15-054-MS-1

Siemens Aktiengesellschafft

Postfach 13623 SIEMENS AG D-13629 Berlin Germany EM MS R&D OC

sgd. Dr. Freundt
EM MS R&D OC

sgd. Mr. Röhling
EM MS R&D OC 1

Berlin, September 28, 2017

Siemens AG
Energy Management Division; Leitung: Ralf Christian
Medium Voltage & Systems; Leitung: Stephan May

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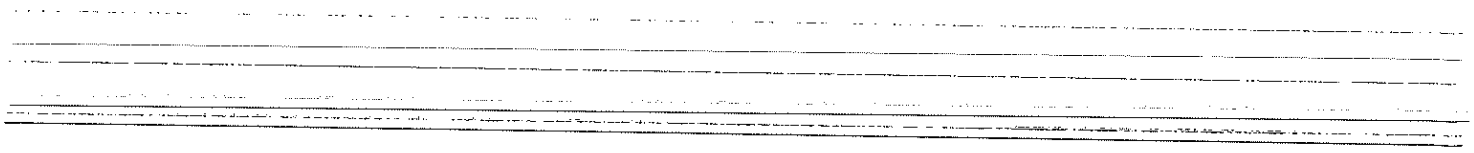

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Energy Management
SOT 11631d

Summary of type tests for Vacuum Circuit-Breaker 3AE5353-2 (24 kV, 20 kA, 1250 A)

If a test is carried out with a vacuum circuit-breaker with different order number, the validity of the test document is given by the following statements:

The listed test documents for the mentioned vacuum circuit-breaker are valid in respect to familiar design of the vacuum circuit-breakers, as the construction of the main current path and mechanical driving mechanism is nearly identical.

Siemens Aktiengesellschafft

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Berlin, September 28, 2017

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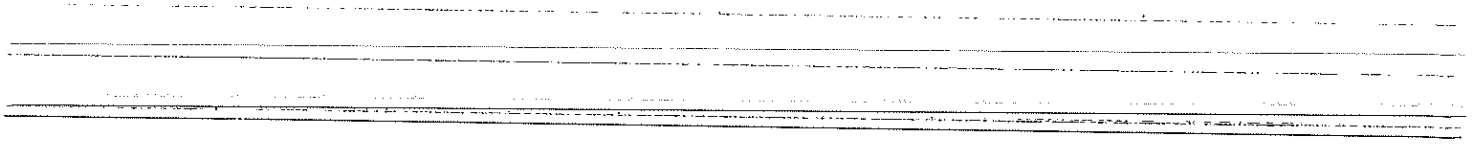

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Energy Management

SOT 11631d

Summary of type tests for Vacuum Circuit-Breaker 3AE5353-2 (24 kV, 20 kA, 1250 A)

In addition to the type tests in accordance with IEC 62271-1 and IEC 62271-100 the following tests were carried out:

Type Tests	Test Documents
Single-phase and double earth fault tests	15-054-MS-1
Capacitive current switching tests: - cable-charging current breaking tests - line-charging current breaking tests - single capacitor bank switching tests	15-065-MS
Out-of-phase making and breaking tests	16-085-MS
Electrical endurance test on class E2	15-096-MS

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sgd. Mr. Röhling
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Berlin, September 28, 2017

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SIEMENS

Енергиен мениджмънт

SOT 11631d

Тестов документ
за вакуумен мощностен прекъсвач 3AE5353-2
(24kV, 20kA, 1250A)

вакуумен мощностен прекъсвач 3AE е типово тестван в съответствие с

IEC 62271-1 версия 1.1,2011-08
IEC 62271-100, версия 2.1, 2012-09 и съответните хармонизиращи документи

за вакуумен мощностен прекъсвач 3AE5353-2 долупосочените тестове са валидни

Изпитания	Стойност	Документ
Диелектрични изпитание на изолацията	U_p = 125kV U_d = 50kV	15-070-MH
Изпитание за температурна устойчивост	I_r= 800 A	15-075-ME
Изпитания за механична устойчивост при температура на околната среда, ниска и висока температура	10.000 Цикъла -25/ +55 °C	15-073-MM 17-086-MM
Изпитания за устойчивост на върхов и ток на късо съединение	I_{sc} =20kA/3s I_{ma} =50kA	15-055-MS
Изпитания за термична и динамична устойчивост	I_{sc} =20kA I_{ma} =50kA	15-054-MS-1

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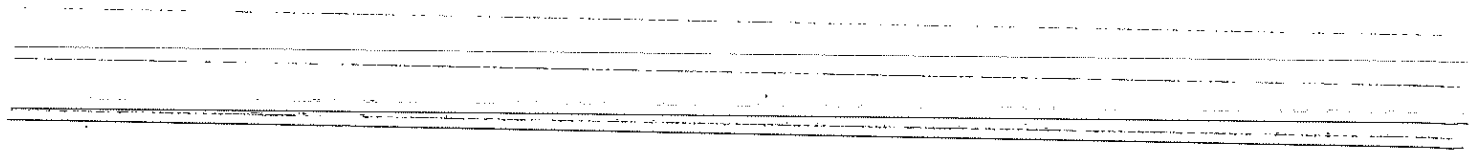
ВЯРНО С ОРИГИНАЛА

MIG 23 ЕООД СОФИЯ MIG 23 LTD



SIEMENS

Енергиен мениджмънт
SOT 11631d

Тестов документ
за вакуумен мощностен прекъсвач 3AE5353-2
(24kV, 20kA, 1250A)

Ако се провежда изпитване с вакуумен прекъсвач с различен поръчков номер, валидността на документа за изпитване се дава чрез следните изявления:

Изброените тестови документи за посочения вакуумен прекъсвач са валидни поради сходен дизайн на вакуумните прекъсвачи и предвид, че конструкцията на пътя на основния ток и механичният задвижващ механизъм са почти еднакви.

Блоебаум */подпис, не се чете/*

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Берлин, 11 Юли 2017

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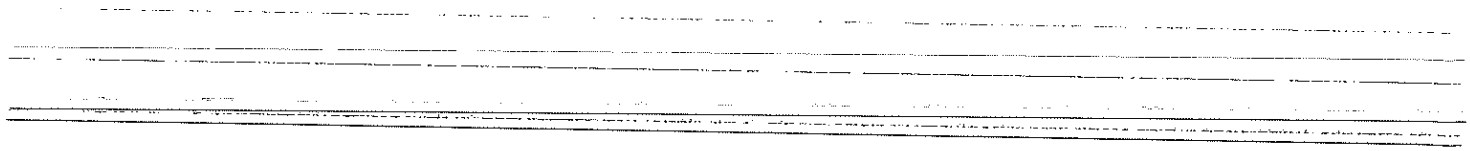

SIEMENS

Енергиен мениджмънт

SOT 11631d

Тестов документ
за вакуумен мощностен прекъсвач 3AE5353-2
(24kV, 20kA, 1250A)

В допълнение към типовите изпитания в съответствие с IEC 62271-1 и IEC 62271-100 са извършени следните тестове:

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Изпитания с капацитивен ток	15-065-MS
Изпитания за термична и динамична устойчивост без фаза	16-085-MS
Тест за електрическа устойчивост, клас E2	15-096-MS

Блоебаум */подпис, не се чете/*

EM MS O SD GF D

Хайнрих */подпис, не се чете/*

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Берлин, 11 Юли 2017

Siemens AG
Направление Енергиен Мениджмънт; Мениджър: Ралф Кристиан
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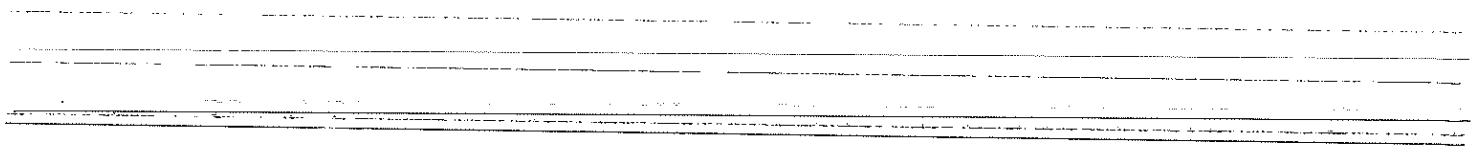
MIG 23 EOOD СОФИЯ MIG 23 LTD



DAkkS
Deutsche
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of
EA, ILAC and IAF for Mutual Recognition

Accreditation

The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory

PEHLA - Gesellschaft für elektrische Hochleistungsprüfungen
Hallenweg 40, 68219 Mannheim

Standort:
PEHLA - Gesellschaft für Elektrische Hochleistungsprüfungen
PEHLA-Prüffeld Berlin-Siemensstadt
Nonnendammallee 104, 13629 Berlin

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

High-Voltage Switchgear and Controlgear
Power Engineering Equipment

The accreditation certificate shall only apply in connection with the notice of accreditation of 2016-02-26 with the accreditation number D-PL-12072-04 and is valid until 2021-02-25. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 12 pages.

Registration number of the certificate: **D-PL-12072-04-00**

На основание чл.36а ал.3 от ЗОП

Frankfurt am Main,
2016-02-26

Ralf Egner
Head of Division

This document is a translation. The definitive version is the original German accreditation certificate.

See notes overleaf.

Deutsche Akkreditierungsstelle GmbH

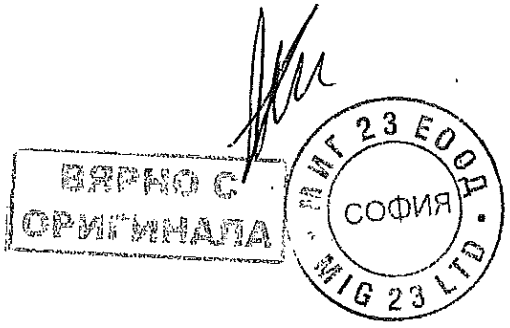
Office Berlin
Spittelmarkt 10
10117 Berlin

Office Frankfurt am Main
Europa-Allee 52
60327 Frankfurt am Main

Office Braunschweig
Bundesallee 100
38116 Braunschweig

The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkkS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.

The up-to-date state of membership can be retrieved from the following websites:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu



Deutsche Akkreditierungsstelle GmbH
(Германски акредитационен орган ГмбХ)

Упълномощен в съответствие с Подраздел 1 на Раздел 8 на AkkStelleG във връзка с Подраздел 1 на Раздел 1 на AkkStelleG
Подписал Многостранните споразумения на EA, ILAF и IAF за взаимно признаване

Акредитация

Deutsche Akkreditierungsstelle GmbH (Германски акредитационен орган ГмбХ) удостоверява, че изпитвателната лаборатория

PEHLA – Gesellschaft für Elektrische Hochleistrungsprüfungen GbR
Hallenweg 40, 68219 Mannheim
(ПЕХЛА – Гезелшафт фюр Електрише Хохлайщрунгспрюфунген ГбР
Халенвег 40, 68219 Манхайм)

Метсоположение:
PEHLA – Gesellschaft für Elektrische Hochleistrungsprüfungen GbR (ПЕХЛА – Гезелшафт фюр Електрише Хохлайщрунгспрюфунген ГбР)
PEHLA-Prüffeld Berlin-Siemensstadt (ПЕХЛА-Прюфелд Берлин-Сименсщат)
Нонендамалее 104, 13629 Берлин

е компетентна по условията на DIN EN ISO/IEC 17025:2005 да извършва изпитания в следните области:

Комутационна апаратура и управляваща апаратура за високо напрежение
Енергетично оборудване

Акредитационният сертификат важи във връзка с известието за акредитация от 26.02.2016 г. с акредитационен номер D-PL-12072-04 и е валиден до 25.02.2021 г. Той се състои от заглавния лист, обратната страна на заглавния лист и следващия анекс с общо 12 страници.

Регистрационен номер на сертификата: **D-PL-12072-04-00**

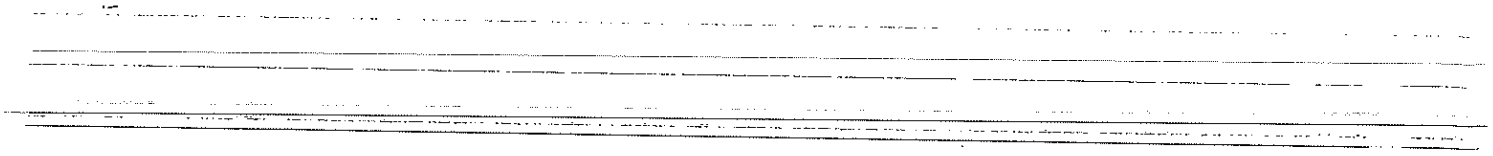
Франкфурт на Майн, 26.02.2016 г.

/подпис – не се чете/
инж. Ралф Егнер
Ръководител отделение

Този документ е превод. Определящата версия е оригиналният германски акредитационен сертификат.

Вж. забележките на обратната страна на листа.

ВЯРНО С ОРИГИНАЛА
ВИГ 23 ЕООД СОФИЯ VIG 23 LTD



Deutsche Akkreditierungsstelle GmbH
(Германски акредитационен орган ГмбХ)

Офис Берлин
Шпителмаркт 10
10117 Берлин

Офис Франкфурт на Майн
Европа алее 52
60327 Франкфурт на Майн

Офис Брауншвайг
Бундесалее 100
38116 Брауншвайг

Публикуването на извадки от акредитационния сертификат подлежи на предварително писмено одобрение от Deutsche Akkreditierungsstelle GmbH (DAkkS). Изключение е непроменената форма на отделни разпространения на заглавния лист от споменатия на обратната страна на листа орган за оценка на съответствието.

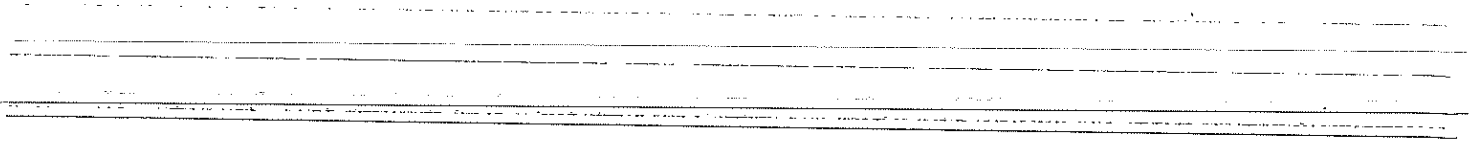
Не трябва да се създава впечатление, че акредикацията е разширена до области извън обхвата на акредитация , удостоверен от DAkkS.

Акредитацията е дадена съгласно Закона за акредитационния орган (AkkStelleG) от 31 юли 2009 г. (Вестник за федерални закони I стр. 2625) и РЕГЛАМЕНТ (ЕО) № 765/2008 на Европейския парламент и на Съвета от 9 юли 2008 г. за определяне на изискванията за акредитация и надзор на пазара във връзка с предлагането на пазара на продукти (Официален вестник на Европейския съюз L 218 от 9 юли 2008 г., стр. 30). DAkkS е подписал Многостранното споразумение за взаимно признаване на европейското сътрудничество за акредитация (EA), Международния акредитационен форум (IAF) и Международното сътрудничество за акредитиране на лаборатории (ILAC). Подписалите тези споразумения признават взаимно своите акредитации.

Текущото състояние на членството може да бъде намерено на следните уебсайтове:
EA: www.european-accreditation.org
ILAC: www. ilac.org
IAF: www.iaf.nu

ВЯРНО С ОРИГИНАЛА

МИГ 23 ЕООД СОФИЯ MIG 23 LTD



ДЕКЛАРАЦИЯ

че предложеното оборудване в процедурата отговаря на минималните технически изисквания на Възложителя, посочени в таблица 1

Долуподписаният Антон Иванов Илиев, в качеството ми на представляващ „МИГ 23" ЕООД, участник в процедура за възлагане на обществена поръчка с предмет: „Модернизация (ретрофит) на възлови разпределителни станции 20 (10) kV и изграждане на вериги на телемеханика, реф. № PPD 18-103, Обособена позиция № 2: Модернизация (ретрофит /проектиране, реконструкция, доставка и монтаж на машини и съоръжения, подготовка и въвеждане в експлоатация/) на възлови разпределителни станции 20 (10) kV и изграждане на вериги на телемеханика в регион регион „Перник - Кюстендил" и регион „Благоевград"

ДЕКЛАРИРАМ, ЧЕ:

че предложеното от нас оборудване в процедурата, отговаря на минималните технически изисквания на Възложителя за СТАНДАРТ НА МАТЕРИАЛА ЗА ТРИПОЛЮСНИ ВАКУУМНИ ПРЕКЪСВАЧИ, 24 KV, ЗА МОНТИРАНЕ НА ЗАКРИТО, ФИКСИРАНИ, посочени в таблица 1, както следва:

Характеристики на работната среда

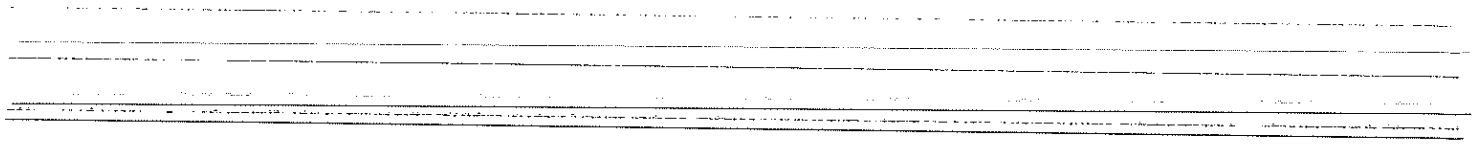
№	Характеристика	Стойност
1.	Максимална околна температура	+ 40°C
2.	Минимална околна температура	Минус 5°C
3.	Максимална средна околна температура за период от 24 ч.	+ 35°C
4.	Относителна влажност	До 95 %
5.	Прахова суспензия	0,01 mg/m^3
6.	Прахови отлагания	0,4 mg/m^2 h
7.	Надморска височина	До 1000 m

Параметри на електроразпределителната мрежа

№	Параметър	Стойност
1.	Номинално напрежение	3~20 000 V
2.	Най-високо напрежение	24 000 V
3.	Обявена честота	50 Hz
4.	Брой на фазите	3
5.	Заземяване на звездния център	през активно съпротивление

Общи технически параметри и други данни за триполюсен вакуумен прекъсвач 24 kV, 1250 A и 630 A, 20 kA, за монтиране на закрито, фиксиран, които се гарантират от Участника чрез Декларация (съгласно образеца в документацията), че предложеното оборудване отговаря на посочените минимални технически изисквания на Възложителя:

№	Технически параметър	Минимални технически изисквания
1.	Обявено напрежение, U_r	24 kV
2.	Обявена честота, f_r	50 Hz
3.	Брой на полюсите (фазите)	3
4.	Обявено разстояние между осите на съседните полюси	≤ 275 mm
5.	Обявено издържано мълниево импулсно напрежение, U_p (върхова стойност) съгласно т. 6.2.6.1 от БДС EN 62271-1:2008 или еквивалент	≥ 125 kV
6.	Обявено краткотрайно (1 min) издържано напрежение с промишлена честота (50 Hz), U_d (ефективна стойност) съгласно т. 6.2.6.2 от БДС EN 62271-1:2008 или еквивалент	≥ 50 kV
7.	Обявен ток на изключване при късо съединение, I_{sc}	≥ 20 kA



№	Технически параметър	Минимални технически изисквания
8.	Обявен краткотраен издържан ток, I_k (t_k=3 s)	≥ 20 kA
9.	Обявен върхов издържан ток (ток на динамична устойчивост), I_p	≥ 40 kA
10.	Обявен ток на изключване при въздушни и кабелни линии:	
-	Обявен ток на изключване при въздушни линии, I_l	≥ 10 A
-	Обявен ток на изключване на кабелни линии, I_c	≥ 25 A
11.	Обявено захранващо напрежение:	
-	Обявено захранващо напрежение на моторно-пружинното задвижване	220 ± 20 % V AC
-	Обявено напрежение на веригите за управление	220 ± 20 % V AC
12.	Включвателен/изключвателен електромагнит	Галванично разделени
13.	Брой на електромагнитите за управление :	
-	изключвателни	≥ 1 бр.
-	включвателен	≥ 1 бр.
14.	Потребявана мощност:	
-	включвателен електромагнит	≤ 250 W
-	изключвателен електромагнит	≤ 250 W
15.	Брой на помощните контакти (изведени на клеморед за присъединяване на проводници със сечение 2,5 mm^2)	
-	нормално отворени	≥ 5 бр.
-	нормално затворени	≥ 5 бр.
-	номинален ток, DC	≥ 10 A
-	номинален ток, AC	≥ 10 A
-	максимален ток, AC	≥ 25 A
-	Импулсен контакт/ Време константа	1 бр./ 40 ms
16.	Време за зареждане на пружината при обявено захранващо напрежение	≤ 10 s
17.	Обявена поредица от комутации (АПВ цикъл)	O-0,3 s-CO-3 min-CO
18.	Разлика в синхронната работа на полюсите на прекъсвача	≤ 2 ms
19.	Класове на комутационна възможност	E2, C2 и M2
20.	Степен на защита на обвивката на моторно-пружинното задвижване и другите комплектуващи компоненти от проникване на твърди тела	≥ IP 2X
21.	Брой на комутационните цикли на полюс (CO) при:	
-	При изключване на номинален ток на късо съединение 5 kA	≥ 1200 бр.
-	При изключване на номинален ток на прекъсвача	≥ 10 000 бр.
-	Количество механични цикли на вакуумната камера до подмяна	≥ 10 000 бр.
-	Количество механични цикли на задвижващия механизъм до основен ремонт	≥ 10 000 бр.
22.	Прекъсвача да има блокировка против многократно включване	Да
23.	Възможност за ръчно зареждане пружината на прекъсвача	Да
24.	Прекъсвача да има индикация за "пружина заредена"	Да
25.	Прекъсвача да има индикация за "включено и изключено състояние" в мнемосхемата	Да
26.	Проектен срок на експлоатация на прекъсвача	≥ 25 години
27.	Гаранционен срок	≥ 36 месеца

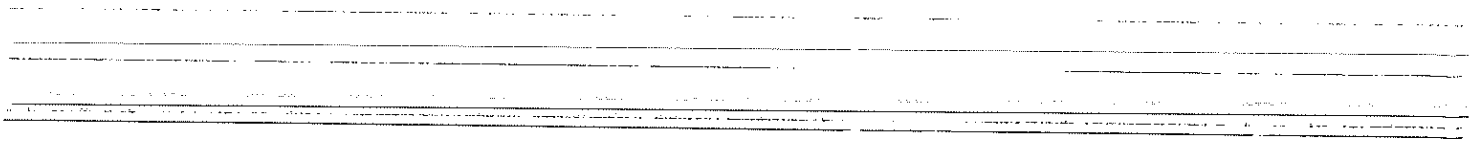
ЛМГ 23 ЕООД СОФИЯ MIG 23 LTD

Декларатор

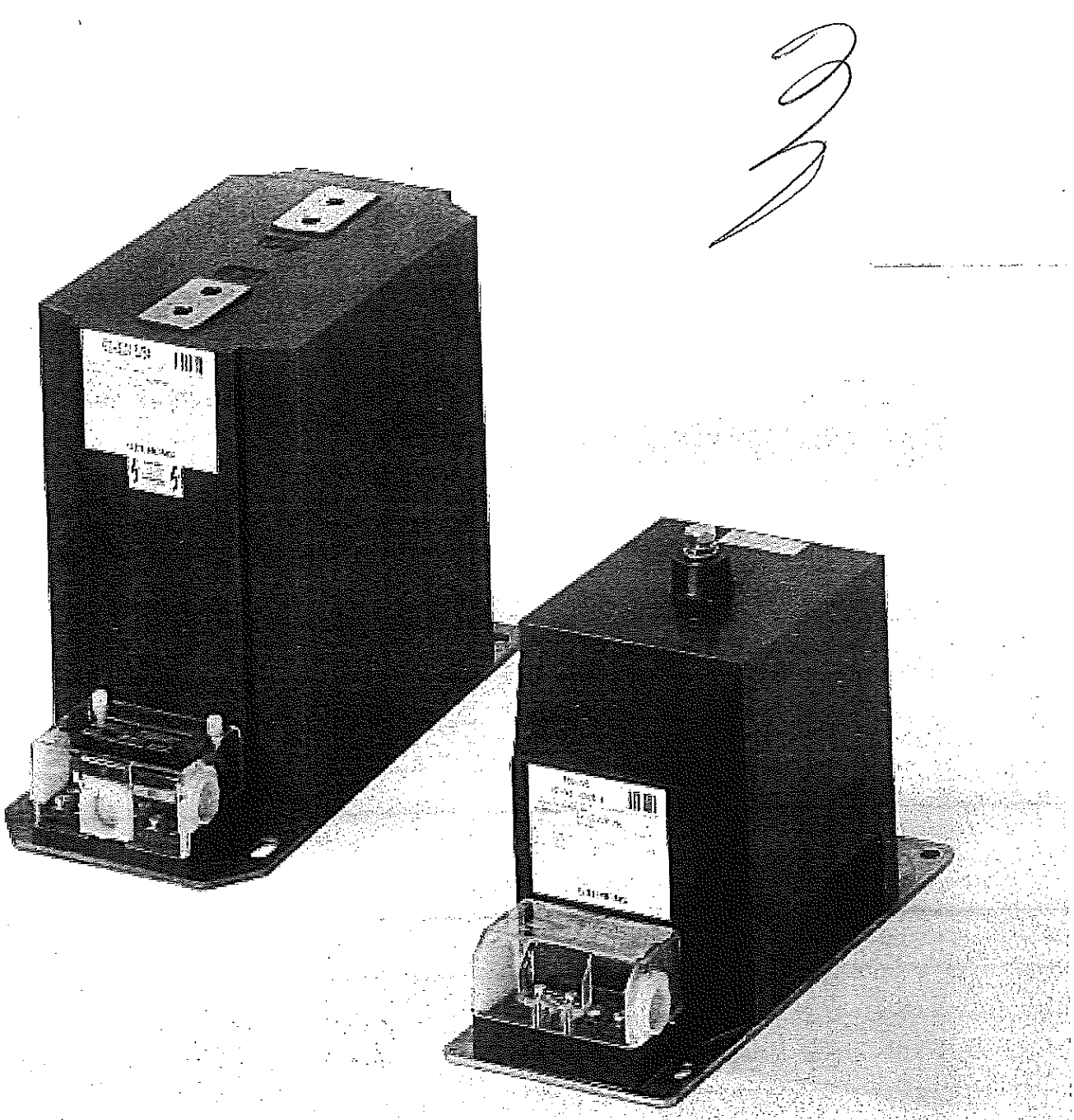
На основание чл.36а ал.3 от ЗОП

Дата 15.12.2018 г.

ТОКОВИ ТРАНСФОРМАТОРИ 24 KV



НАПРЕЖЕНОВИ ТРАНСФОРМАТОРИ
24 KV



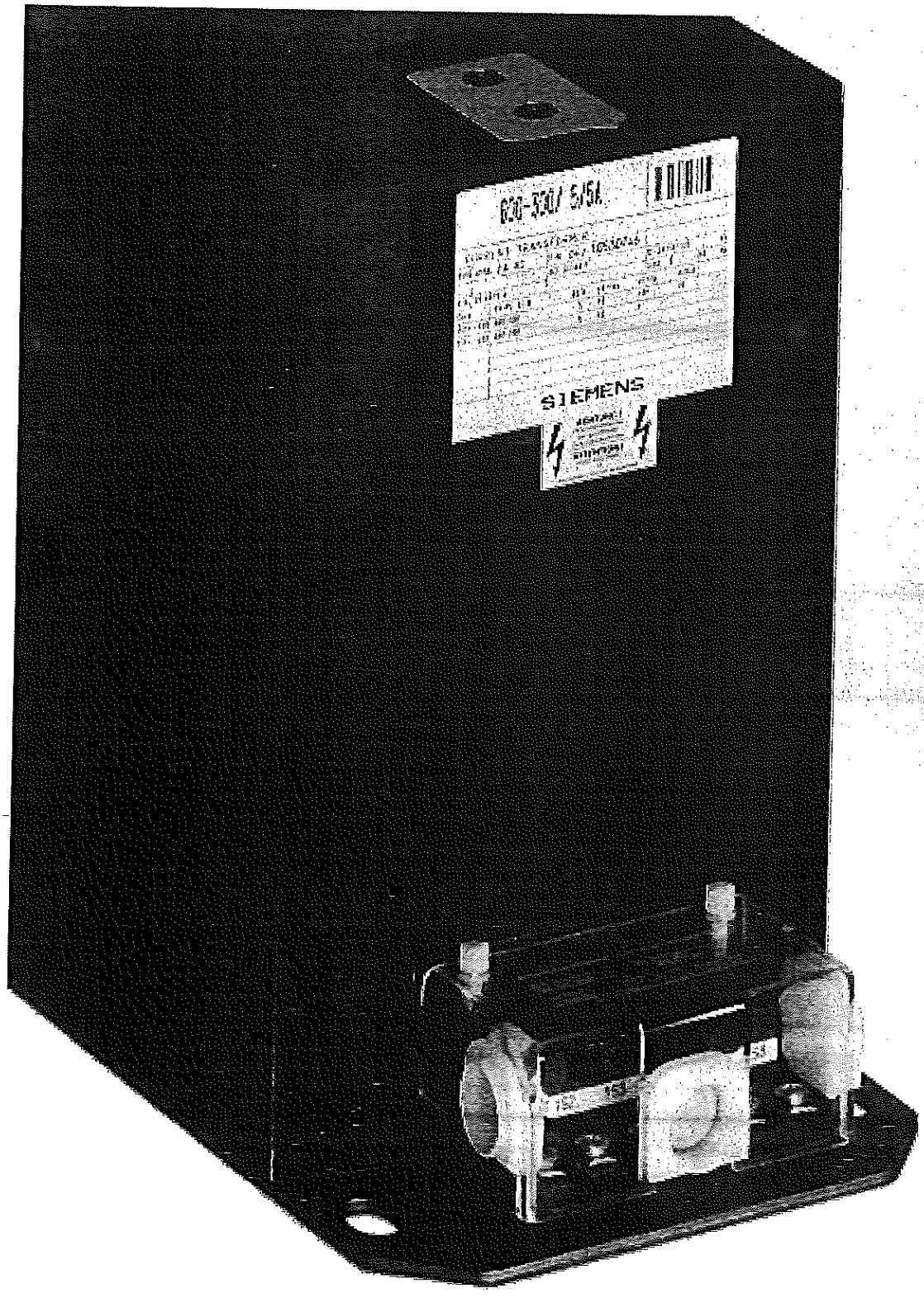
4M Protective and Measuring Transformers

Medium-Voltage Equipment
Selection and Ordering Data

Catalog HG 24 · 2009

Answers for energy.

SIEMENS



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4M Protective and Measuring Transformers

Medium-Voltage Equipment
Catalog HG 24 · 2009

Invalid: Catalog HG 24 · 1994

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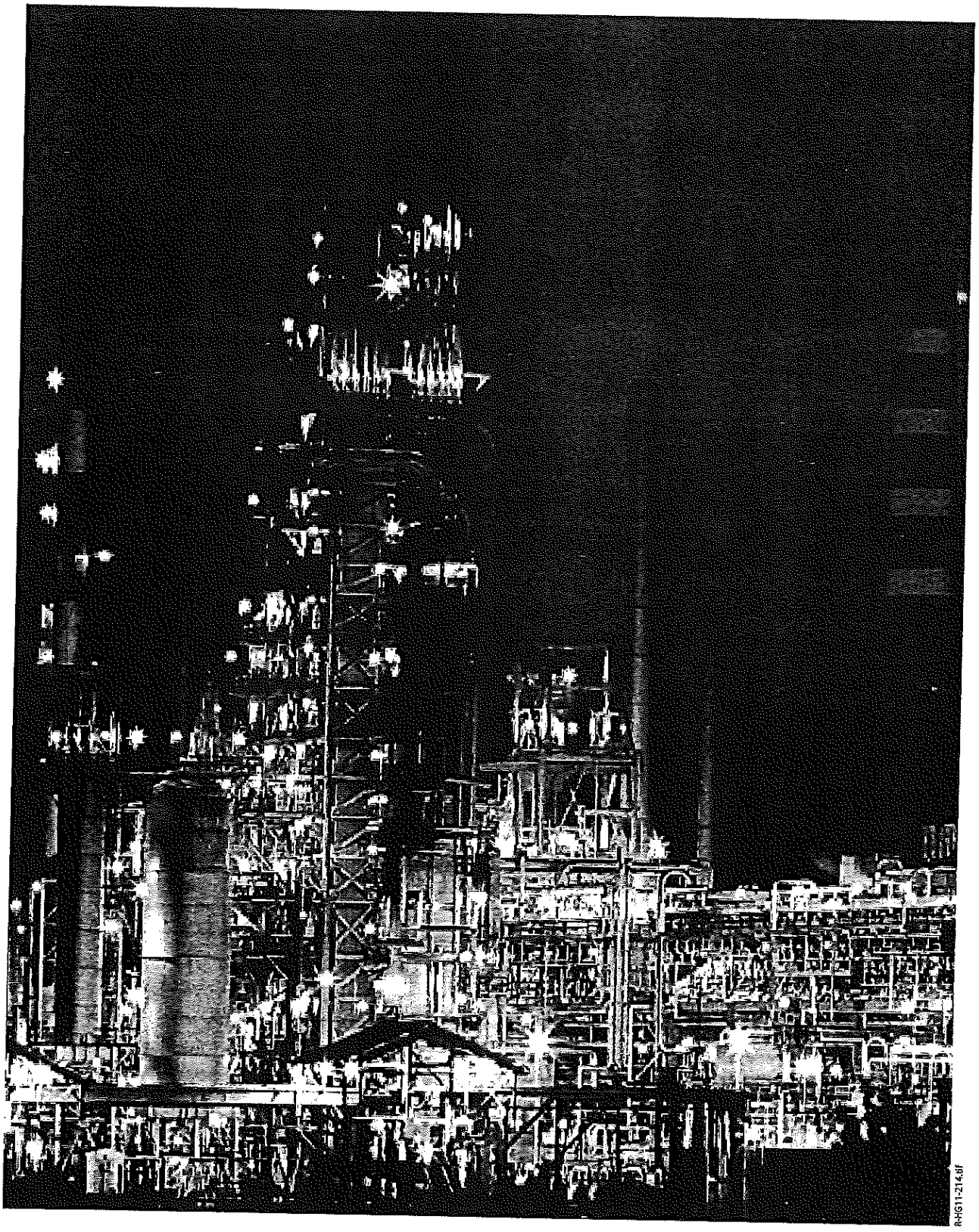
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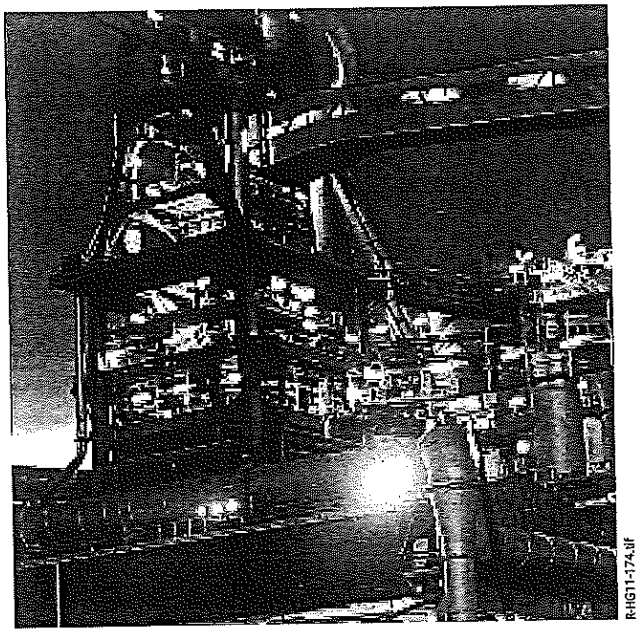

Industrial application: Refinery

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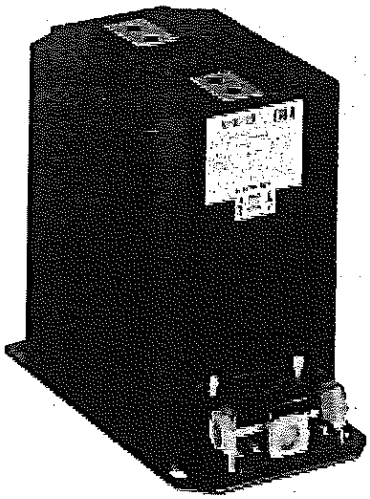
1

Protective and Measuring Transformers – The Adaptable

1

The task of instrument transformers is to transform high currents and voltages proportionally and in-phase into small current or voltage values for measuring or protection purposes. So they are used either to measure and record the transmitted power or to feed protection devices with evaluable signals, which enable the protection device to e.g. trip a switching device depending on the situation. Furthermore, they isolate the connected measuring or protection equipment electrically from live parts of the switchgear.

Current transformer



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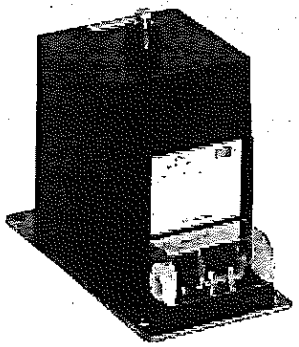
Current transformers can be regarded as transformers working in short-circuit, with the full normal current flowing through their primary side. Devices connected on the secondary side are series-connected. Current transformers can have several secondary windings with magnetically separated cores of the same or different characteristics. They can, for example, be equipped with two measuring cores of different accuracy class, or with measuring and protection cores with different accuracy limit factors.

Due to the risk of overvoltages, current transformers must not be operated with open secondary terminals, but only in short circuit or with the burden of the measuring equipment.

Voltage transformer



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Voltage transformers contain only one magnet core and are normally designed with one single secondary winding. If necessary, earthed (single-phase) voltage transformers are provided with an additional residual voltage winding (earth-fault winding) beside the secondary winding (measuring winding).

In contrast to current transformers, voltage transformers must never be short-circuited on the secondary side. The earth-side terminal of the primary winding is effectively earthed in the terminal box, and must not be removed in operation.

1

Types of construction

Protective and measuring transformers are designed in different types of construction for the multiple installation requirements and operating conditions they are subjected to. They are electrical devices which convert primary electrical values – currents or voltages – into proportional and in-phase values that are adequate for the connected devices such as measuring instruments, meters, protection relays and similar. A distinction is made here between current and voltage transformers.

The following transformer types are available for selection in this catalog:

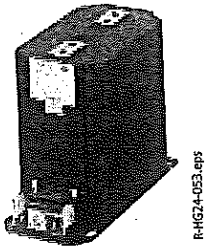
Current transformers

- Indoor support-type current transformer in block-type design
- Indoor support-type current transformer in single-turn design (e.g. bar-primary transformer)
- Indoor bushing-type current transformer in single-turn design
- Indoor bar-primary bushing-type current transformer
- Outdoor support-type current transformer

Voltage transformers

- Earthed (single-phase) or unearthed (double-phase) indoor transformers in different sizes
- Earthed (single-phase) or unearthed (double-phase) outdoor transformers in different sizes

The transformers offered in the selection are only a part of the possible variations. If the transformer required is not shown, please clarify the feasibility with the responsible sales partner or the order processing department in the Switchgear Factory Berlin. The same applies to transformers according to the ANSI standard.



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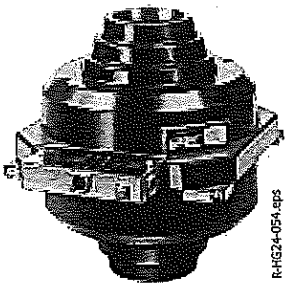
Example for transformer in block-type design



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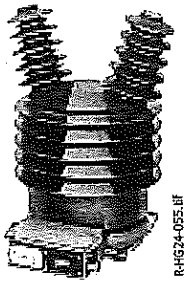
Example for bushing-type transformer



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Example for outdoor transformer

Approvals/Certifications

In Germany, instrument transformers may only be used for commercial purposes, such as billing metering of electricity, if they have been approved once (type approval) by the Physikalisch-Technische Bundesanstalt (PTB) (Federal Physical-Technical Institute), and if every transformer is calibrated by an officially recognised inspecting authority.

Calibration is done by a calibration office, or by the transformer manufacturer on behalf of a calibration office. The test is documented by means of a test mark as well as a calibration certificate.

The calibration costs are charged in accordance with the official scale of fees.

1

Current transformers

Current transformers can be regarded as transformers operating in short circuit, which carry the full rated current on the primary side. The devices on the secondary side are series-connected. They can have several secondary windings with mechanically separated cores of the same or different characteristics. Thus, current transformers can be designed e.g. with two measuring cores of different accuracy class, or with measuring or protection cores with different accuracy limit factors.

Due to the risk of overvoltages, current transformers must not be operated with open secondary terminals, but only in short circuit or with the burden of the measuring equipment.

Glossary of terms

Rated current I_N (r.m.s. value in A)

The rated primary (I_{PN}) and secondary (I_{SN}) current is the current that characterises the transformer, or the current it is designed for. Both values are given on the transformer rating plate. The rated primary current (I_{PN}) depends on the power system and is defined by the system operator.

Usual values for primary currents (in A):

10; 12.5; 15; 20; 25; 30; 40; 50; 60; 75

and their decimal multiples (preferred values are underlined).

Usual values for secondary currents: 1 and 5 A.

For technical reasons, but above all for economical reasons, 1 A is recommended as secondary current, especially if there are long measuring leads.

Rated continuous thermal current I_D (thermal strength)

The value of the current which can be permitted to flow continuously in the primary winding, the secondary winding being connected to the rated burden, without the temperature rise exceeding the values specified.

I_D is often equal to I_N, but it can also be defined as a multiple thereof.

Rated short-time thermal current I_{th}

The r.m.s. value of the primary current, flowing in case of short circuit, which a current transformer will withstand for 1 or 3 seconds without suffering harmful effects, the secondary winding being short-circuited.

Rated dynamic current I_{dyn}

The peak value of the primary current which a transformer will withstand, without being damaged electrically or mechanically by the resulting electromagnetic forces, the secondary winding being short-circuited.

Rated transformation ratio K_N

The ratio of the rated primary current to the rated secondary current. It is expressed as an unreduced fraction, e.g. 500 A/1 A.

Rated output S_N

The value of the apparent power (in VA at a specified power factor), for which the current transformer has to keep the accuracy class at the rated secondary current and with rated burden. Thus, the rated output describes the capacity of a current transformer to "drive" the secondary current within the error limits by means of a burden.

Current transformers can feature the following preferred rated outputs: 2.5 VA; 5 VA; 10 VA; 15 VA; 30 VA.

Rated burden Z_N

The burden is the apparent resistance of the devices connected on the secondary side (including all connection leads), for which the current transformer has to keep the stipulated class limits. The burden is normally expressed as apparent power in VA.

Current error F_i

The current error of a current transformer is (in %):

$$F_i = 100 \cdot \frac{K_N \cdot I_{sec} - I_{prim}}{I_{prim}}$$

K_N Rated transformation ratio
I_{prim} Actual primary current
I_{sec} Actual secondary current

Phase displacement d_i

The difference in phase between the primary and secondary current vectors, the direction of the vectors being so chosen that the angle is zero for a perfect transformer.

The phase displacement is said to be positive when the secondary current vector leads the primary current vector. It is usually expressed in minutes.

Limits of current error and phase displacement according to IEC 60044-1

Accuracy class	± current error in percent at rated current I_n				± phase displacement in minutes at rated current I_n			
	120 %	100 %	20 %	5 %	120 %	100 %	20 %	5 %
Measuring current transformers								
0.2	0.2	0.2	0.35	0.75	10	10	15	30
0.5	0.5	0.5	0.75	1.5	30	30	45	80
1	1	1	1.5	3	60	60	90	100
Protective current transformers								
5P	–	1	–	–	–	60	–	–
10P	–	3	–	–	–	–	–	–

1

Measuring current transformers

Current transformers provided for the connection of measuring instruments, meters and similar devices (e.g. 10 VA Cl. 0.5 FS5).

Rated instrument limit primary current

The value of the primary current at rated burden and a composite error of 10 %.

Instrument security factor n

The ratio of rated instrument limit primary current to the rated primary current

Note:

In the event of short-circuit currents flowing through the primary winding of a current transformer, the thermal stress to the measuring instruments supplied by the current transformer is smallest when the value of the rated instrument security factor is small.

Accuracy class

The limit of the percentage current error at rated current I_N (see table).

Generally, current transformers are used for a measuring range of 5 % to 120 % of the rated primary current.

Special designs

Extended current ratings

Current transformers with ext. 200 % can be continuously operated at 2 x I_N, and keep the error limits of their class in the range up to 200 % of the rated primary current.

Protective current transformers

Current transformers intended to supply protection relays (e.g. 15 VA Cl. 10 P 10).

Accuracy class (identification P)

The limit of the percentage current error for the rated accuracy limit primary current.

Rated accuracy limit primary current

The value of primary current up to which the transformer will comply with the requirements for composite error.

Accuracy limit factor

The ratio of the rated accuracy limit primary current to the rated primary current.

Multi-ratio current transformers

If the ratio of current transformers has to be variable, e.g. for planned switchgear extensions, it is possible to use multi-ratio current transformers.

Primary multi-ratio

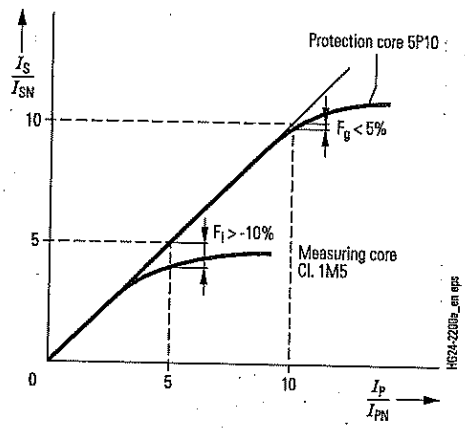
Only possible for wound-primary transformers (transformers with several primary turns) with a ratio of 1:2 (e.g. 2 x 600 A/1 A). Reconnection is made by re-arrangement of copper lugs in the primary connection area. Ratings, instrument security factors as well as the secondary internal resistance remain constant during reconnection.

Secondary multi-ratio

In single-turn and wound-primary transformers, this can be implemented by taps of the secondary windings (e.g. 2000–1000 A/1 A).

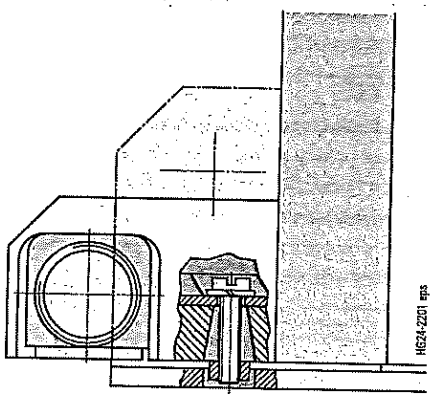
Ratings or instrument security factors change almost linearly with the ratio. If not stated otherwise, the specified rated data is always referred to the lower current value.

1



Overcurrent performance of current transformers when loaded with rated burden

F_i Current error
F_g Composite error



Earthing of the secondary winding, for example, in a 4MA7 current transformer

Performance in the event of overcurrent

In the event of an overcurrent, the rated secondary current increases proportionally with the rated primary current up to the rated instrument limit primary current.

The ratio of the rated instrument limit primary current to the rated primary current provides the instrument security factor assigned to the core. In accordance with this factor, the rated instrument limit primary current is subjected to specific error limits.

The measuring and protection cores place different demands on these error limits.

For measuring cores, the current error F_i is > −10 % in order to protect the supplied measuring devices, meters, etc. safely in case of overcurrent.

In protection cores, the composite error F_g is max. 5 % (5P) or 10 % (10P) in order to ensure the desired protection tripping.

The specified limits are only fulfilled at the rated burden of the transformer. If the operating burden differs from the rated burden of the transformer, the instrument security factor changes as follows:

$$n' = n \cdot \frac{Z_N + S_E}{S + S_E}$$

n' Actual instrument security factor
n Rated instrument security factor
Z_N Rated burden in VA
S_E Internal power consumption of the transformer in VA (approx. 5 % to 20 % of Z_N)
S Actually connected burden in VA

Operation and earthing

The secondary circuits of current transformers must never be open during operation, as dangerously high voltages can occur, especially at high currents and cores with high ratings.

All metal parts of a transformer that are not live, but accessible, must be earthed. Therefore, the transformers have earth connection points identified with the earthing symbol. Also, one terminal of the secondary winding (for current transformers, normally k or 1s, etc.) must be earthed.

For earthing the secondary windings, a thread is provided under each secondary terminal. The earth connection required is made by fitting a special screw.

Capacitively coupled voltage detecting system

The guidelines for every medium-voltage switchgear of the new generation state that doors and covers can only be opened when there is no risk of electric shock. The movable single-pole voltage testers used up to now are not suitable for this. Therefore, every medium-voltage switchgear is offered with a system including a fixed-mounted capacitive voltage divider.

The capacitive voltage detecting system consists of a capacitive divider which divides the voltage U between the phase L and earth into the partial voltages U_1 and U_2, and of an indicator applied to U_2. The indicator contains a glow lamp that flashes when voltage is applied.

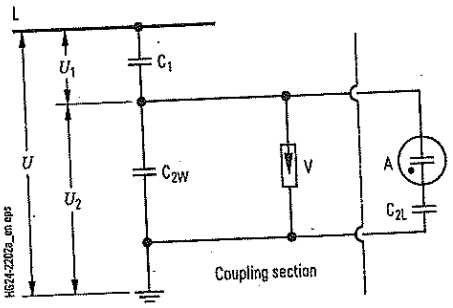
Indication range:
At 0.01 x U_N, no indication,
as of 0.40 x U_N, secure indication.

On request, support-type current transformers type 4MA7 can be delivered with capacitive layers for the voltage detecting system – then they contain a coupling electrode. This electrode is cast in a firm and protected way, and lead out at the secondary terminals with the designation CK. These current transformers are routine-tested additionally for compliance with the requested capacitance values (C_1 and C_{2W}). These values are documented on an additional label.

To ensure protection against electric shock even in the most improbable case that the current transformer punctures with the high-voltage capacitor (while an operator is touching the test sockets), a surge arrester is connected in parallel to this arrangement inside the transformer. If the high voltage is exceeded, it responds within nanoseconds, limiting the voltage at the test socket to harmless values.

Important for the ordering selection

When ordering transformers with capacitive layers it is necessary to state the actual operating voltage U_N (rated voltage), e.g. U_m = 24 kV, U_N = 15 kV.



Voltage detecting system

A Indicator
C_1 High-voltage capacitance (transformer)
C_{2W} Low-voltage capacitance (transformer)
C_{2L} Low-voltage capacitance (lead)
L High-voltage phase
U Voltage between phase and earth
U_1 Partial voltage at C_1
U_2 Partial voltage at C_2 and A
V Surge arrester

1

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Voltage transformers

Voltage transformers have only one magnet core, and are normally designed with one single secondary winding. If necessary, earthed (single-phase) voltage transformers are equipped with an additional residual voltage winding (earth-fault winding) beside the secondary winding (measuring winding).

In contrast to current transformers, voltage transformers must never be short-circuited on the secondary side. The earth-side terminal of the primary winding is effectively earthed in the terminal box, and must not be removed during operation.

Glossary of terms

Highest voltage for equipment U_m

The highest r.m.s. phase-to-phase voltage (in kV) for which a transformer is designed in respect of its insulation.

Rated voltage U_N

The voltage values (primary U_{PN} or secondary U_{SN}) stated on the rating plate of a transformer. If the voltage transformers are connected between phase and earth in three-phase systems, this phase-to-neutral voltage is considered the rated voltage. Except for the residual voltage winding, it is expressed as $U/\sqrt{3}$, with U being the phase-to-phase voltage.

U_m kV	Rated primary voltage kV	Rated secondary voltage V
up to 52	3.3 3.6 4.8 5 6 6.6 7.2 10 11 13.8 15 17.5 20 22 30 33 35 40 45	100 110 120
	or the values divided by $\sqrt{3}$	or the values divided by $\sqrt{3}$

Rated transformation ratio K_N

The ratio of the rated primary voltage to the rated secondary voltage. It is expressed as unreduced fraction, e.g.

$10000/\sqrt{3}$ V / $100/\sqrt{3}$ V (single-phase)
10000 V/100 V (double-phase).

Voltage error F_U

The voltage error expressed in percent is defined by the formula:

$$F_U = 100 \cdot \frac{K_N \cdot U_{sec} - U_{prim}}{U_{prim}}$$

U_{prim} Actual primary voltage
U_{sec} Actual secondary voltage under measuring conditions when U_{prim} is applied

Phase displacement

The difference in phase between the primary voltage and the secondary voltage vectors, the direction of the vectors being so chosen that the angle is zero for a perfect transformer. The phase displacement is said to be positive when the secondary voltage vector leads the primary voltage vector. It is usually expressed in minutes.

Limits for voltage error and phase displacement according to IEC 60044-1

The voltage error and phase displacement at rated frequency shall not exceed the values given in the table at any voltage between 80 % and 120 % of rated voltage and with burdens of between 25 % and 100 % of rated burden at a power factor of 0.8 lagging.

Accuracy class	± voltage error %	± phase displacement Minutes
0.2	0.2	10
0.5	0.5	20
1	1	40

Rated output S_N

The value of the apparent power (in VA at a specified power factor) which the transformer is intended to supply to the secondary circuit at the rated secondary voltage and with rated burden connected to it.

Preferred values:

Accuracy class	Rated output VA						
0.2	10	15	30	50	–	–	–
0.5	10	15	30	50	75	100	–
1	–	–	30	50	75	100	200

Thermal limiting output S_{th}

The value of the apparent power referred to rated voltage which can be taken from a secondary winding, at rated primary voltage applied, without exceeding the limits of temperature rise.

Thermal limiting output of the residual voltage winding

As the residual voltage winding is connected in broken delta, it is only stressed in case of fault. Therefore, the thermal limiting output of the residual voltage winding is referred to a stress duration of e.g. 8 h, and is expressed in VA.

Rated voltage factor

The multiplying factor to be applied to the rated primary voltage to determine the maximum voltage at which a transformer must comply with the relevant thermal requirements for a specified time and with the relevant accuracy requirements.

Multi-ratio

Voltage transformers for different rated primary voltages can only be reconnected on the secondary side for reasons of insulation.

Operation and earthing

In contrast to current transformers, voltage transformers must never be short-circuited on the secondary side. The earth-side primary terminal of earthed voltage transformers is insulated for a test voltage of 2 kV. It is connected to the earthed base plate in the terminal box.

Attention

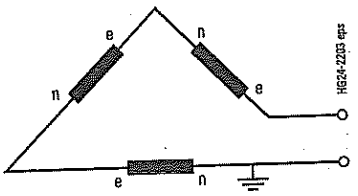
This connection must not be opened during operation.

Residual voltage windings connected in broken delta may only be earthed together at one point.

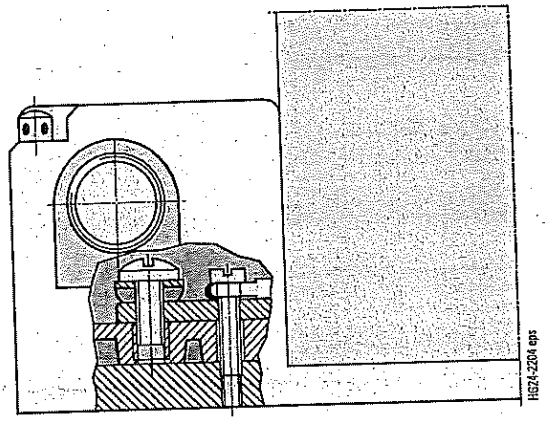
For earthing the secondary windings, a thread is provided under each secondary terminal. The earth connection required is established by fitting a special screw.

Relaxation oscillations

When single-phase voltage transformers are used in isolated systems, damping of the e–n windings connected in broken delta is recommended in order to avoid the possible destruction of the voltage transformers by relaxation oscillations.

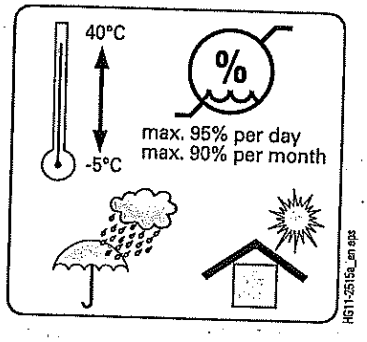


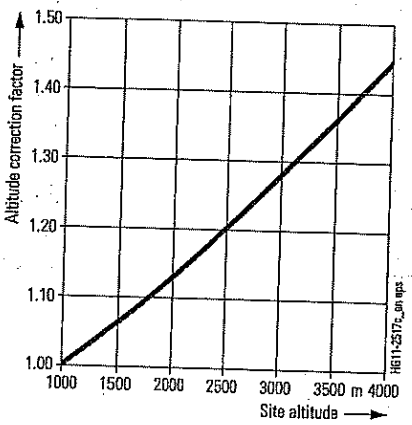
Connection and earthing of the e–n or da–dn winding



Earthing of the secondary winding, for example, in a 4MR voltage transformer

1





Highest voltage for equipment U_m	Rated short-duration power-frequency withstand voltage	Rated lightning impulse withstand voltage
kV	kV	V
7.2	20	60
12	28	75
17.5	38	95
24	50	125
36	70	170
52	95	250

Ambient conditions

The transformers are designed for the normal operating conditions defined in the standards.

The conditions shown opposite apply to indoor transformers. All indoor transformers are suitable for use with high air humidity and occasional condensation (e.g. in tropical areas).

As for outdoor transformers, the following conditions apply:

Minimum temperature

Outdoor transformers class 25	–25 °C
Outdoor transformers class 40	–40 °C

Relative air humidity

Outdoor transformers	up to 100 %

Dielectric strength

The dielectric strength of air insulation decreases with increasing altitude due to low air density. According to IEC 62271-1, the values of the rated lightning impulse withstand voltage and the rated short-duration power-frequency withstand voltage specified, among others, in the chapter "Technical Data" apply to a site altitude of 1000 m above sea level. For an altitude above 1000 m, the insulation level must be corrected according to the opposite diagram.

The characteristic shown applies to both rated withstand voltages.

To select the devices, the following applies:

$U \geq U_0 \times K_a$

U Rated withstand voltage under reference atmosphere
U_0 Rated withstand voltage requested for the place of installation
K_a Altitude correction factor according to the opposite diagram

Example

For a requested rated lightning impulse withstand voltage of 75 kV at an altitude of 2500 m, an insulation level of 90 kV under reference atmosphere is required as a minimum:

90 kV ≥ 75 kV x 1.2

Test voltages and insulation level for instrument transformers

Proper operation of the transformers is proved by the following tests:

- Impulse test (type test)
- Separate source withstand voltage test (routine test)
- Induced voltage withstand test (routine test)
- Partial discharge measurement (routine test)

All transformers correspond to insulation class E, i.e. the maximum temperature rise is 120 °C.

Partial discharge measurement

Apart from the tests mentioned on page 14, partial discharge measurements are required for current and voltage transformers to test the insulation. A partial discharge is to be understood as any small, brief electrical discharge appearing on or in a test object when voltage is applied. The discharges appear as soon as the partial discharge inception voltage of the insulating medium is exceeded at any point.

Relatively high field strengths appear at sharp edges and peaks of metal parts, or also on bubbles and gas inclusions in solid or liquid insulating materials.

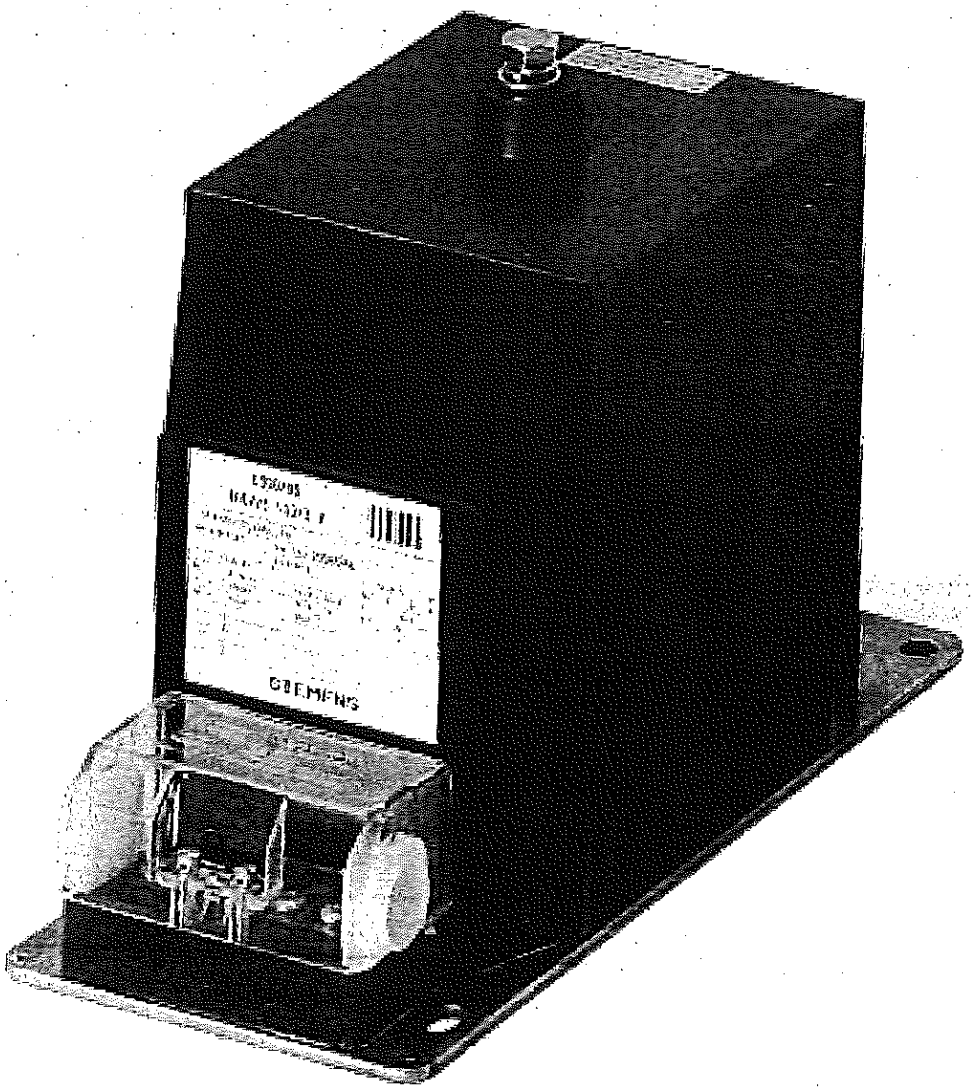
Partial discharges act like HF emitters, producing a mixture of the most different frequencies. The partial discharge measurement enables an assessment about the homogeneity of the insulating material. Partial discharge measurements are performed as a routine test on inductive transformers with solid insulation as of $U_m = 3.6$ kV.

Type of earthing	Type of transformer	Pre-stressing voltage ≥ 10 s	Measuring voltage ≥ 1 min	Permissible partial discharge level Apparent load
Systems with isolated or impedance earthed neutral	Current transformers and earthed voltage transformers	$1.3\ U_m$	$1.1\ U_m$	250 pC
			$1.1\frac{U_m}{\sqrt{3}}$	50 pC
	Unearthed voltage transformers	$1.3\ U_m$	$1.1\ U_m$	50 pC
Systems with solidly earthed neutral	Current transformers and earthed voltage transformers	$0.8 \times 1.3\ U_m$	$1.1\frac{U_m}{\sqrt{3}}$	50 pC
	Unearthed voltage transformers	$1.3\ U_m$	$1.1\ U_m$	50 pC

Standards

Protective and measuring transformers conform to the following standards:

- VDE 0414 "Stipulations for instrument transformers"
- VDE 0111 "Insulation co-ordination for equipment in three-phase systems above 1 kV"
- IEC 60044-1
- IEC 60044-2
- ANSI 1675 (IEEE)
- DIN 42600



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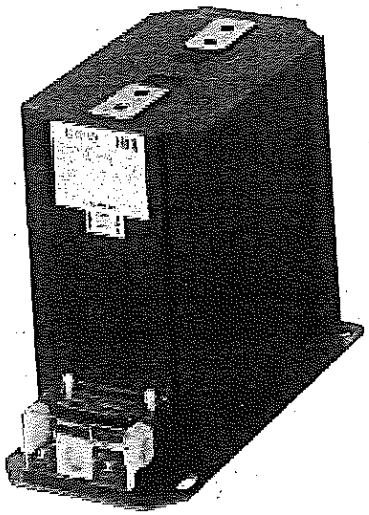

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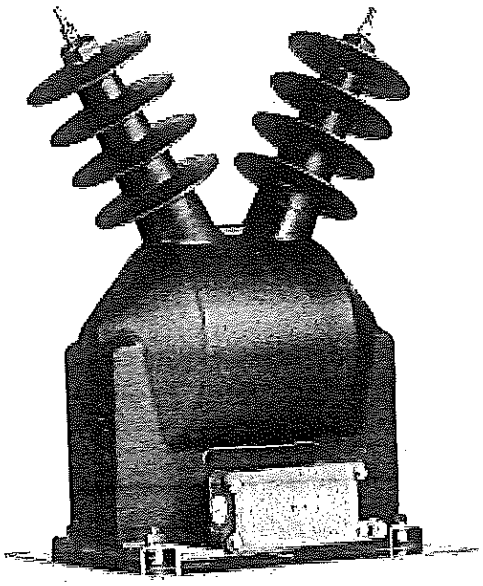
4MA74 current transformer



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4MS6 outdoor voltage transformer

2

Order number structure

Protective and measuring transformers are described by a 12 or 16-digit order number. The first five characters describe the type, design and application of the transformer (primary part), and the positions 6 to 12 or 6 to 16 identify the core data of the transformer.

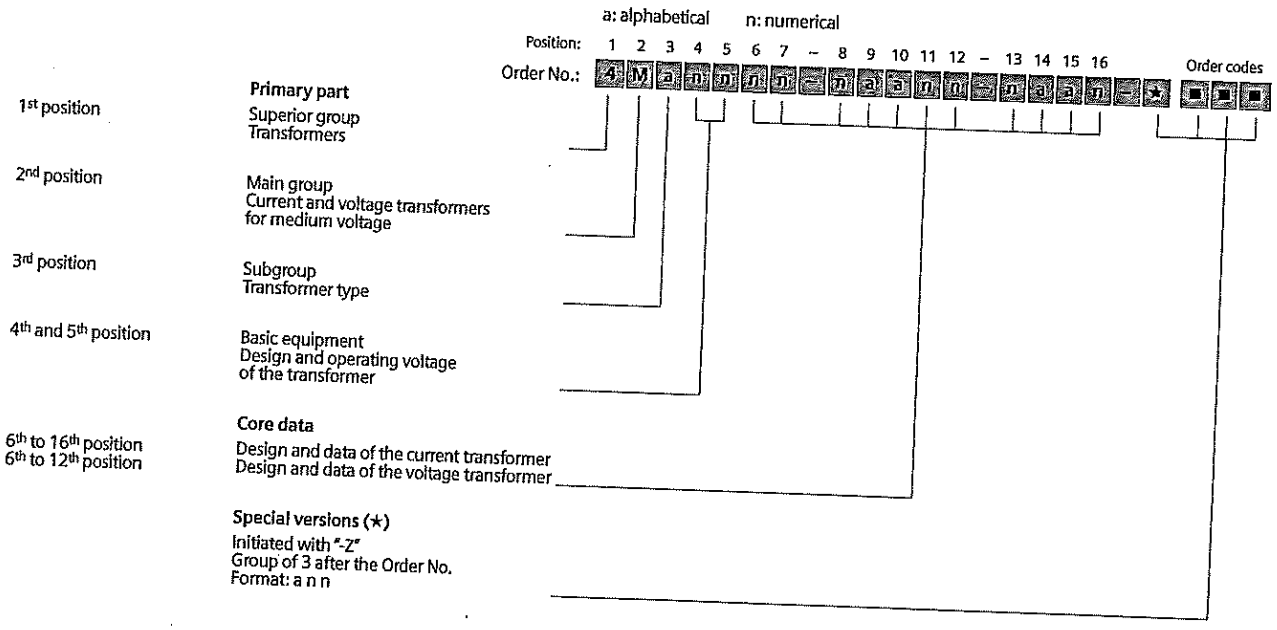
The transformers offered in the selection are only a part of the possible variations. If the transformer required is not shown, please clarify the feasibility with the responsible sales partner or the order processing department at the Switchgear Factory Berlin. The same applies to transformers according to the ANSI standard.

Order codes

Individual equipment versions, marked with **9** or **Z** in the 9th to 16th position, are explained more in detail by a 3-digit order code. Several order codes can be added to the order number in succession and in any sequence.

Built-on components and special versions (★)

For built-on components and special versions, "**-Z**" is added to the order number and a descriptive order code follows. If several built-on components and special versions are required, the suffix "**-Z**" is listed only once. If a requested special version is not in the catalog and can therefore not be ordered via order code, it has to be identified with **Y 9 9** after consultation. The agreement hereto is made directly between your responsible sales partner and the order processing department in the Switchgear Factory Berlin.



Configuration example

At the end of each of the following pages with selection data you will find a configuration example to make the order number structure more clear.
Starting from the last selection of the basic type, this example is continued, so that at the end of the equipment selection a completely configured and orderable transformer results for every product group.

On the foldout page we offer a configuring aid. Here you can fill in the order number you have determined for your transformer.

Example for Order No.: 4 M A 7 2 4 4 – ■ ■ ■ ■ ■ – ■ ■ ■ ■
Order codes:

Current transformer, type of construction according to IEC [1)]

Illustration	Type of design	Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	Order codes
		Order No.:	4	M	■	■	■	■	■	–	■	■	■	■	■	–	■	■	■	■	■ ■ ■

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Indoor support-type current transformer, block-type design, small type according to DIN 42600, cast-resin insulated, operating voltage up to 12 kV, 24 kV or 36 kV — **4 M A 7** Selection from page **20ff**

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Indoor support-type current transformer, single-turn design, cast-resin insulated, operating voltage up to 12 kV or 24 kV — **4 M B 1** Selection from page **41ff**

R-HG24-061.eps

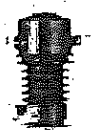
Indoor bushing-type current transformer, single-turn design, cast-resin insulated, operating voltage up to 12 kV, 24 kV or 36 kV — **4 M C 2** Selection from page **44ff**

R-HG24-054.eps

Indoor bar-primary bushing-type current transformer, cast-resin insulated, operating voltage up to 12 kV, 24 kV or 36 kV — **4 M C 3** Selection from page **47ff**

R-HG24-062.eps

Outdoor support-type current transformer, cast-resin insulated, operating voltage up to 12 kV, 24 kV or 36 kV — **4 M E 2** Selection from page **53ff**



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Outdoor support-type current transformer, top-assembly type, operating voltage up to 12 kV, 24 kV, 36 kV and 52 kV — **4 M E 3** Selection from page **58ff**

1) Transformers according to ANSI standard on request

Example for Order No.: 4 M A 7

Order codes:

4MA7 indoor support-type current transformer, block-type design

5th position

Operating voltage (maximum value)

Operating voltage U_m kV	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes Order No.:
12	75	28	4 M A 7 2
17.5	95	38	4 M A 7 2
24	125	50	4 M A 7 4
36	170	70	4 M A 7 6

See page 21 · See page 21 · See page 22 to page 39 · See page 40 · See page 40 · See page 40

– Z F 1 8

6th/7th position

Rated short-time thermal current

Rated short-time thermal current I_{th} kA	Remark	
8		
12.5		3 3 4 0
16		
20		4 4 4 8
25		
31.5		5 4 5 7
40		
50	Not for U_m = 36 kV	6 3 6 7
63	Not for U_m = 24 kV and U_m = 36 kV	
		7 1

Configuration example

Indoor support-type current transformer, block-type design
Maximum operating voltage U_m = 12 kV
Rated lightning impulse withstand voltage U_p = 75 kV
Rated short-duration power-frequency withstand voltage U_d = 28 kV
Rated short-time thermal current I_{th} = 16 kA

4 M A 7 2 4 4

Example for Order No.: 4 M A 7 2 4 4 – ■ ■ ■ ■ ■ – ■ ■ ■ ■

Order codes:

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M A 7 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★ ■ ■ ■

8th/9th position
Rated primary current

Rated primary current I_{PN} A	Rated primary current, with primary multi-ratio J_{PN} A	Rated short-time thermal current I_{th} 8 kA	12.5 kA	16 kA	20 kA	25 kA	31.5 kA	40 kA	50 kA	63 kA	8th/9th position	See page 22 to page 39	See page 40	See page 40	See page 40
20		■	■	■							0 E				
25		■	■	■							0 F				
30		■	■	■							0 G				
40		■	■	■	■						0 H				
50		■	■	■	■						0 J				
60		■	■	■	■						0 K				
75		■	■	■	■	■					0 L				
100		■	■	■	■	■					0 M				
125		■	■	■	■	■	■				0 N				
150		■	■	■	■	■	■				0 P				
200		■	■	■	■	■	■	■			0 Q				
250		■	■	■	■	■	■	■			0 R				
300		■	■	■	■	■	■	■			0 S				
400		■	■	■	■	■	■	■	■		0 T				
500		■	■	■	■	■	■	■	■		0 U				
600		■	■	■	■	■	■	■	■		0 V				
750		■	■	■	■	■	■	■	■	■	0 W				
800		■	■	■	■	■	■	■	■	■	0 X				
1000		■	■	■	■	■	■	■	■	■	1 A				
1200		■	■	■	■	■	■	■	■	■	1 B				
1250		■	■	■	■	■	■	■	■	■	1 C				
1500		■	■	■	■	■	■	■	■	■	1 D				
2000		■	■	■	■	■	■	■	■	■	1 F				
2500		■	■	■	■	■	■	■	■	■	1 G				
	2x 20	■	■	■							3 E				
	2x 25	■	■	■							3 F				
	2x 30	■	■	■							3 G				
	2x 40	■	■	■	■						3 H				
	2x 50	■	■	■	■						3 J				
	2x 60	■	■	■	■						3 K				
	2x 75	■	■	■	■	■					3 L				
	2x 100	■	■	■	■	■					3 M				
	2x 125	■	■	■	■	■	■				3 N				
	2x 150	■	■	■	■	■	■				3 P				
	2x 200	■	■	■	■	■	■	■			3 Q				
	2x 250	■	■	■	■	■	■	■			3 R				
	2x 300	■	■	■	■	■	■	■	■		3 S				
	2x 400	■	■	■	■	■	■	■	■		3 T				
	2x 500	■	■	■	■	■	■	■	■	■	3 U				
	2x 600	■	■	■	■	■	■	■	■	■	3 V				

■ Feasible (other combinations on request)

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Configuration example
Indoor support-type current transformer, block-type design
(U_m = 12 kV, U_p = 75 kV, U_d = 28 kV, I_{th} = 16 kA)
Rated primary current I_{PN} = 100 A

Example for Order No.: 4 M A 7 2 4 4 – 0 M

Order codes: 4 M A 7 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★ ■ ■ ■

8 kA

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength
100 A 125 A 150 A 200 A 250 A 300 A 400 A 500 A 600 A 750 A 1000 A 1200 A 1250 A 1500 A 2000 A 2500 A	100 x I_{PN}
60 A 75 A	150 x I_{PN}
40 A 50 A	200 x I_{PN}
30 A	300 x I_{PN}
20 A 25 A	400 x I_{PN}

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M A 7 ■ 3 3 – ■ ■ ■ ■ ■ – ■ ■ ■ ■ s. p. 40 s. p. 40 s. p. 40 ■ ■ ■

0
1
2
3
4

1st core			2nd core			Thermal strength							
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10										■	■	■
		15										■	■	■
0.5	FS5	10										■	■	■
		15										■	■	■
		30										■	■	■
1	FS5	10										■	■	■
		15										■	■	■
		30										■	■	■
5P	10	5										■	■	■
		10										■	■	■
		15										■	■	■
		30										■	■	■
10P	10	5										■	■	■
		10										■	■	■
		15										■	■	■
		30										■	■	■
0.5	FS5	5	5P	10	5							■	■	■
		10			10							■	■	■
		15			15							■	■	■
		30			30							■	■	■
0.5	FS5	5	10P	10	5							■	■	■
		10			10							■	■	■
		15			15							■	■	■
		30			30							■	■	■
1	FS5	5	5P	10	5							■	■	■
		10			10							■	■	■
		10			15							■	■	■
		15			15							■	■	■
		15			30							■	■	■
		30			30							■	■	■
1	FS5	5	10P	10	5							■	■	■
		10			10							■	■	■
		10			15							■	■	■
		15			15							■	■	■
		15			30							■	■	■
		30			30							■	■	■

■ Feasible (other combinations on request)

C 2 – 0 A
C 3 – 0 A
E 2 – 0 A
E 3 – 0 A
E 4 – 0 A
H 2 – 0 A
H 3 – 0 A
H 4 – 0 A
L 1 – 0 A
L 2 – 0 A
L 3 – 0 A
L 4 – 0 A
Q 1 – 0 A
Q 2 – 0 A
Q 3 – 0 A
Q 4 – 0 A
E 1 – 1 L
E 2 – 2 L
E 3 – 3 L
E 4 – 4 L
E 1 – 1 Q
E 2 – 2 Q
E 3 – 3 Q
E 4 – 4 Q
H 1 – 1 L
H 2 – 2 L
H 2 – 3 L
H 3 – 3 L
H 3 – 4 L
H 4 – 4 L
H 1 – 1 Q
H 2 – 2 Q
H 2 – 3 Q
H 3 – 3 Q
H 3 – 4 Q
H 4 – 4 Q

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 8 kA, I_{PN} = 100 A)
Thermal strength 100 x I_{PN}
1st core class 5P; instrument security factor 10; rating 30 VA
2nd core without

4 M A 7 2 3 3 – 0 M D L 4 0 – 0 A

Example for Order No.: 4 M A 7 2 3 3 – 0 M L 4 0 – 0 A ■ ■
Order codes:

8 kA – with primary multi-ratio

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength
2x 100 A 2x 125 A 2x 150 A 2x 200 A 2x 250 A 2x 300 A 2x 400 A 2x 500 A 2x 600 A	100 x I_{PN}
2x 60 A 2x 75 A	150 x I_{PN}
2x 40 A 2x 50 A	200 x I_{PN}
2x 30 A	300 x I_{PN}
2x 20 A 2x 25 A	400 x I_{PN}

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 — Order codes

Order No.: 4 M A 7 ■ 3 3 – ■ ■ ■ ■ ■ – ■ ■ ■ ■ — ■ ■

s.p. 40 s.p. 40 s.p. 40

0 1 2 3 4

1st core			2nd core			Thermal strength								
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10										■	■	■
		15										■	■	■
0.5	FS5	10										■	■	■
		15										■	■	■
		30										■	■	■
1	FS5	10										■	■	■
		15										■	■	■
		30										■	■	■
5P	10	5										■	■	■
		10										■	■	■
		15										■	■	■
		30										■	■	■
10P	10	5										■	■	■
		10										■	■	■
		15										■	■	■
		30										■	■	■
0.5	FS5	5	5P	10	5					□	■	■	■	■
		10			10					□	■	■	■	■
		15			15					□	■	■	■	■
		30			30					□	■	■	■	■
0.5	FS5	5	10P	10	5					□	■	■	■	■
		10			10					□	■	■	■	■
		15			15					□	■	■	■	■
		30			30					□	■	■	■	■
1	FS5	5	5P	10	5					□	■	■	■	■
		10			10					□	■	■	■	■
		10			15					□	■	■	■	■
		15			15					□	■	■	■	■
		15			30					□	■	■	■	■
		30			30					□	■	■	■	■
1	FS5	5	10P	10	5					□	■	■	■	■
		10			10					□	■	■	■	■
		10			15					□	■	■	■	■
		15			15					□	■	■	■	■
		15			30					□	■	■	■	■
		30			30					□	■	■	■	■

■ Feasible (other combinations on request)

□ Not for 2x 40 A

C 2 – 0 A
C 3 – 0 A
E 2 – 0 A
E 3 – 0 A
E 4 – 0 A
H 2 – 0 A
H 3 – 0 A
H 4 – 0 A
L 1 – 0 A
L 2 – 0 A
L 3 – 0 A
L 4 – 0 A
Q 1 – 0 A
Q 2 – 0 A
Q 3 – 0 A
Q 4 – 0 A
E 1 – 1 L
E 2 – 2 L
E 3 – 3 L
E 4 – 4 L
E 1 – 1 Q
E 2 – 2 Q
E 3 – 3 Q
E 4 – 4 Q
H 1 – 1 L
H 2 – 2 L
H 2 – 3 L
H 3 – 3 L
H 3 – 4 L
H 4 – 4 L
H 1 – 1 Q
H 2 – 2 Q
H 2 – 3 Q
H 3 – 3 Q
H 3 – 4 Q
H 4 – 4 Q

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 8 kA, I_{PN} = 2x 100 A)
Thermal strength 100 x I_{PN}
1st core class 1; instrument security factor FS5; rating 15 VA
2nd core class 10P; accuracy limit factor 10; rating 30 VA

4 M A 7 2 3 3 – 3 M H 3 D – 4 Q

Example for Order No.: 4 M A 7 2 3 3 – 3 M H 3 D – 4 Q

Order codes:

12.5 kA

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength	1st core Class	1st core Factor	1st core VA rating	2nd core Class	2nd core Factor	2nd core VA rating	Thermal strength 1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}	Order codes
125 A 150 A 200 A 250 A 300 A 400 A 500 A 600 A 750 A 1000 A 1200 A 1250 A 1500 A 2000 A 2500 A	100 x I_{PN}	0,2	FS10	10													0
				15													
		0.5	FS5	10													
				15													
				30													
		1	FS5	10													
				15													
				30													
		5P	10	5													
				10													
				15													
				30													
		10P	10	5													
				10													
				15													
				30													
100 A	150 x I_{PN}	0.5	FS5	5	5P	10	5										2
				10			10										
				15			15										
				30			30										
75 A	200 x I_{PN}	0.5	FS5	5	10P	10	5										3
				10			10										
				15			15										
				30			30										
50 A 60 A	300 x I_{PN}	1	FS5	5	5P	10	5										4
				10			10										
				10			15										
				15			15										
				15			30										
				30			30										
40 A	400 x I_{PN}	1	FS5	5	10P	10	5										5
				10			10										
				10			15										
				15			15										
				15			30										
				30			30										
25 A 30 A	500 x I_{PN}	1	FS5	5	10P	10	5										7
				10			10										
				10			15										
				15			15										
				15			30										
				30			30										
20 A	800 x I_{PN}	1	FS5	5	10P	10	5										
				10			10										
				10			15										
				15			15										
				15			30										
				30			30										

■ Feasible (other combinations on request)

Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16		
Order No.:	4	M	A	7	■	4	0	–	■	■	■	■	■	–	■	■	■	■	–	■
																	s. p. 40	s. p. 40	s. p. 40	Order codes

10th to 14th position	10th position	11th position	12th position	13th position	14th position	15th position	16th position
	0	1	–	0	A		
	2	3	–	0	A		
	4	5	–	0	A		
	7	■	–	0	A		
	C	2	–	0	A		
	C	3	–	0	A		
	E	2	–	0	A		
	E	3	–	0	A		
	E	4	–	0	A		
	H	2	–	0	A		
	H	3	–	0	A		
	H	4	–	0	A		
	L	1	–	0	A		
	L	2	–	0	A		
	L	3	–	0	A		
	L	4	–	0	A		
	Q	1	–	0	A		
	Q	2	–	0	A		
	Q	3	–	0	A		
	Q	4	–	0	A		
	E	1	–	1	L		
	E	2	–	2	L		
	E	3	–	3	L		
	E	4	–	4	L		
	E	1	–	1	Q		
	E	2	–	2	Q		
	E	3	–	3	Q		
	E	4	–	4	Q		
	H	1	–	1	L		
	H	2	–	2	L		
	H	2	–	3	L		
	H	3	–	3	L		
	H	3	–	4	L		
	H	4	–	4	L		
	H	1	–	1	Q		
	H	2	–	2	Q		
	H	2	–	3	Q		
	H	3	–	3	Q		
	H	3	–	4	Q		
	H	4	–	4	Q		

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 12.5 kA, I_{PN} = 100 A)
Thermal strength 150 x I_{PN}
1st core class 10P; instrument security factor 10; rating 5 VA
2nd core without

	4	M	A	7	2	4	0	–	0	M											
											Q	1	1	–	0	A					
Example for Order No.:	4	M	A	7	2	4	0	–	0	M	Q	1	1	–	0	A	■	■			
Order codes:																					

12.5 kA – with primary multi-ratio

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength
2x 125 A 2x 150 A 2x 200 A 2x 250 A 2x 300 A 2x 400 A 2x 500 A 2x 600 A	100 x I_{PN}
2x 100 A	150 x I_{PN}
2x 75 A	200 x I_{PN}
2x 50 A 2x 60 A	300 x I_{PN}
2x 40 A	400 x I_{PN}
2x 25 A 2x 30 A	500 x I_{PN}
2x 20 A	800 x I_{PN}

1st core			2nd core			Thermal strength							
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10								■	■	■	■	■
		15								■	■	■	■	■
0.5	FS5	10					■	■	■	■	■	■	■	■
		15						■	■	■	■	■	■	■
		30								■	■	■	■	■
1	FS5	10					■	■	■	■	■	■	■	■
		15					■	■	■	■	■	■	■	■
		30						■	■	■	■	■	■	■
5P	10	5					■	■	■	■	■	■	■	■
		10						■	■	■	■	■	■	■
		15								■	■	■	■	■
		30										■	■	■
10P	10	5					■	■	■	■	■	■	■	■
		10					■	■	■	■	■	■	■	■
		15						■	■	■	■	■	■	■
		30										■	■	■
0.5	FS5	5	5P	10	5		■	■	■	■	■	■	■	■
		10			10						■	■	■	■
		15			15						■	■	■	■
		30			30							■	■	■
0.5	FS5	5	10P	10	5		■	■	■	■	■	■	■	■
		10			10						■	■	■	■
		15			15							■	■	■
		30			30							■	■	■
1	FS5	5	5P	10	5		■	■	■	■	■	■	■	■
		10			10			■	■	■	■	■	■	■
		10			15						■	■	■	■
		15			15						■	■	■	■
		15			30							■	■	■
		30			30							■	■	■
1	FS5	5	10P	10	5		■	■	■	■	■	■	■	■
		10			10			■	■	■	■	■	■	■
		10			15						■	■	■	■
		15			15						■	■	■	■
		15			30							■	■	■
		30			30							■	■	■

■ Feasible (other combinations on request)

Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16		Order codes		
Order No.:	4	M	A	7	■	4	0	–	■	■	■	■	■	–	■	■	■	■	–	■	■	■
																	s. p. 40	s. p. 40		s. p. 40		

0
1
2
3
4
5
7

C 2 – 0 A
C 3 – 0 A
E 2 – 0 A
E 3 – 0 A
E 4 – 0 A
H 2 – 0 A
H 3 – 0 A
H 4 – 0 A
L 1 – 0 A
L 2 – 0 A
L 3 – 0 A
L 4 – 0 A
Q 1 – 0 A
Q 2 – 0 A
Q 3 – 0 A
Q 4 – 0 A
E 1 – 1 L
E 2 – 2 L
E 3 – 3 L
E 4 – 4 L
E 1 – 1 Q
E 2 – 2 Q
E 3 – 3 Q
E 4 – 4 Q
H 1 – 1 L
H 2 – 2 L
H 2 – 3 L
H 3 – 3 L
H 3 – 4 L
H 4 – 4 L
H 1 – 1 Q
H 2 – 2 Q
H 2 – 3 Q
H 3 – 3 Q
H 3 – 4 Q
H 4 – 4 Q

Configuration example

indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 12.5 kA, I_{PN} = 2x 100 A)
Thermal strength 150 x I_{PN}
1st core class 0.5; instrument security factor FS5; rating 15 VA
2nd core class 10P; accuracy limit factor 10; rating 15 VA

4 M A 7 2 4 0 – 3 M 1 E 3 – 3 Q

Example for Order No.: 4 M A 7 2 4 0 – 3 M E 3 1 – 3 Q ■
Order codes:

16 kA

10th to 14th position
Core versions

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 | Order codes

Order No.: 4 M A 7 ■ 4 4 – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – Z | ■ ■ ■

(Position 15: s. p. 40; position 16: s. p. 40; Z: s. p. 40)

At rated primary current I_{PN}	Thermal strength	Position 12
200 A 250 A 300 A 400 A 500 A 600 A 750 A 800 A 1000 A 1200 A 1250 A 1500 A 2000 A 2500 A	$100 \times I_{PN}$	0
125 A 150 A	$150 \times I_{PN}$	1
100 A	$200 \times I_{PN}$	2
60 A 75 A	$300 \times I_{PN}$	3
40 A 50 A	$400 \times I_{PN}$	4
30 A	$600 \times I_{PN}$	6
25 A	$800 \times I_{PN}$	7
20 A	$1000 \times I_{PN}$	8

1st core			2nd core			Thermal strength									Order No. positions 10–14
Class	Factor	VA rating	Class	Factor	VA rating	$1000 \times I_{PN}$	$800 \times I_{PN}$	$600 \times I_{PN}$	$500 \times I_{PN}$	$400 \times I_{PN}$	$300 \times I_{PN}$	$200 \times I_{PN}$	$150 \times I_{PN}$	$100 \times I_{PN}$	
0.2	FS10	10								■	■	■	■	■	C 2 – 0 A
		15								■	■	■	■	■	C 3 – 0 A
0.5	FS5	10				■	■	■		■	■	■	■	■	E 2 – 0 A
		15					■	■		■	■	■	■	■	E 3 – 0 A
		30								■	■	■	■	■	E 4 – 0 A
1	FS5	10				■	■	■		■	■	■	■	■	H 2 – 0 A
		15				■	■	■		■	■	■	■	■	H 3 – 0 A
		30						■		■	■	■	■	■	H 4 – 0 A
5P	10	5				■	■	■		■	■	■	■	■	L 1 – 0 A
		10						■		■	■	■	■	■	L 2 – 0 A
		15								■	■	■	■	■	L 3 – 0 A
		30										■	■	■	L 4 – 0 A
10P	10	5				■	■	■		■	■	■	■	■	Q 1 – 0 A
		10				■	■	■		■	■	■	■	■	Q 2 – 0 A
		15						■		■	■	■	■	■	Q 3 – 0 A
		30									■	■	■	■	Q 4 – 0 A
0.5	FS5	5	5P	10	5		■	■		■	■	■	■	■	E 1 – 1 L
		10			10			■		■	■	■	■	■	E 2 – 2 L
		15			15							■	■	■	E 3 – 3 L
		30			30								■	■	E 4 – 4 L
0.5	FS5	5	10P	10	5		■	■		■	■	■	■	■	E 1 – 1 Q
		10			10					■	■	■	■	■	E 2 – 2 Q
		15			15						■	■	■	■	E 3 – 3 Q
		30			30							■	■	■	E 4 – 4 Q
1	FS5	5	5P	10	5	■	■	■		■	■	■	■	■	H 1 – 1 L
		10			10					■	■	■	■	■	H 2 – 2 L
		10			15						■	■	■	■	H 2 – 3 L
		15			15						■	■	■	■	H 3 – 3 L
		15			30							■	■	■	H 3 – 4 L
		30			30							■	■	■	H 4 – 4 L
1	FS5	5	10P	10	5	■	■	■		■	■	■	■	■	H 1 – 1 Q
		10			10					■	■	■	■	■	H 2 – 2 Q
		10			15						■	■	■	■	H 2 – 3 Q
		15			15						■	■	■	■	H 3 – 3 Q
		15			30							■	■	■	H 3 – 4 Q
		30			30							■	■	■	H 4 – 4 Q

■ Feasible (other combinations on request)

Configuration example

Indoor support-type current transformer, block-type design — 4 M A 7

(U_m = 12 kV, I_{th} = 16 kA, I_{PN} = 100 A) — 2 4 4 – 0 M

Thermal strength $200 \times I_{PN}$ — 2

1st core class **0.5**; instrument security factor **FS5**; rating **10 VA** — E 2

2nd core class **5P**; accuracy limit factor **10**; rating **10 VA** — – 2 L

Example for Order No.: 4 M A 7 2 4 4 – 0 M E 2 2 – 2 L ■ ■

Order codes:

16 kA – with primary multi-ratio

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength
2x 200 A 2x 250 A 2x 300 A 2x 400 A 2x 500 A 2x 600 A	100 x I_{PN}
2x 125 A 2x 150 A	150 x I_{PN}
2x 100 A	200 x I_{PN}
2x 60 A 2x 75 A	300 x I_{PN}
2x 40 A 2x 50 A	400 x I_{PN}
2x 30 A	600 x I_{PN}
2x 25 A	800 x I_{PN}
2x 20 A	1000 x I_{PN}

1st core			2nd core			Thermal strength								
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10								■	■	■	■	■
		15								■	■	■	■	■
0.5	FS5	10						■	■	■	■	■	■	■
		15						■	■	■	■	■	■	■
		30								■	■	■	■	■
1	FS5	10						■	■	■	■	■	■	■
		15						■	■	■	■	■	■	■
		30								■	■	■	■	■
5P	10	5						■	■	■	■	■	■	■
		10							■	■	■	■	■	■
		15								■	■	■	■	■
		30										■	■	■
10P	10	5						■	■	■	■	■	■	■
		10						■	■	■	■	■	■	■
		15								■	■	■	■	■
		30										■	■	■
0.5	FS5	5	5P	10	5				■	■	■	■	■	■
		10			10						■	■	■	■
		15			15							■	■	■
		30			30									■
0.5	FS5	5	10P	10	5					■	■	■	■	■
		10			10							■	■	■
		15			15									■
		30			30									■
1	FS5	5	5P	10	5			■	■	■	■	■	■	■
		10			10					■	■	■	■	■
		10			15							■	■	■
		15			15									■
		15			30									■
		30			30									■
1	FS5	5	10P	10	5			■	■	■	■	■	■	■
		10			10					■	■	■	■	■
		10			15							■	■	■
		15			15									■
		15			30									■
		30			30									■

■ Feasible (other combinations on request)

Configuration example
Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 16 kA, I_{PN} = 2x 100 A)
Thermal strength 200 x I_{PN}
1st core class 0.5; instrument security factor FS5; rating 10 VA
2nd core without

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M A 7 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■

s. p. 40 s. p. 40 s. p. 40

10th position	11th position	12th position	13th position	14th position	15th position	16th position
0	1	2	–	0	A	
		3				
		4				
		6				
		7				
		8				
C	2		–	0	A	
C	3		–	0	A	
E	2		–	0	A	
E	3		–	0	A	
E	4		–	0	A	
H	2		–	0	A	
H	3		–	0	A	
H	4		–	0	A	
L	1		–	0	A	
L	2		–	0	A	
L	3		–	0	A	
L	4		–	0	A	
Q	1		–	0	A	
Q	2		–	0	A	
Q	3		–	0	A	
Q	4		–	0	A	
E	1		–	1	L	
E	2		–	2	L	
E	3		–	3	L	
E	4		–	4	L	
E	1		–	1	Q	
E	2		–	2	Q	
E	3		–	3	Q	
E	4		–	4	Q	
H	1		–	1	L	
H	2		–	2	L	
H	2		–	3	L	
H	3		–	3	L	
H	3		–	4	L	
H	4		–	4	L	
H	1		–	1	Q	
H	2		–	2	Q	
H	2		–	3	Q	
H	3		–	3	Q	
H	3		–	4	Q	
H	4		–	4	Q	

4 M A 7 2 4 4 – 3 M E 2 2 – 0 A

Example for Order No.: 4 M A 7 2 4 4 – 3 M E 2 2 – 0 A

Order codes:

20 kA

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength
200 A 250 A 300 A 400 A 500 A 600 A 750 A 1000 A 1200 A 1250 A 1500 A 2000 A 2500 A	100 x I_{PN}
150 A	150 x I_{PN}
100 A 125 A	200 x I_{PN}
75 A	300 x I_{PN}
50 A 60 A	400 x I_{PN}
40 A	500 x I_{PN}
30 A	800 x I_{PN}
25 A	1000 x I_{PN}

1st core			2nd core			Thermal strength							
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10							■	■	■	■	■	■
		15							■	■	■	■	■	■
0.5	FS5	10						■	■	■	■	■	■	■
		15						■	■	■	■	■	■	■
		30							■	■	■	■	■	■
1	FS5	10						■	■	■	■	■	■	■
		15						■	■	■	■	■	■	■
		30							■	■	■	■	■	■
5P	10	5						■	■	■	■	■	■	■
		10							■	■	■	■	■	■
		15							■	■	■	■	■	■
		30							■	■	■	■	■	■
10P	10	5						■	■	■	■	■	■	■
		10						■	■	■	■	■	■	■
		15							■	■	■	■	■	■
		30							■	■	■	■	■	■
0.5	FS5	5	5P	10	5			■	■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		15			15				■	■	■	■	■	■
		30			30					■	■	■	■	■
0.5	FS5	5	10P	10	5			■	■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		15			15					■	■	■	■	■
		30			30						■	■	■	■
1	FS5	5	5P	10	5			■	■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		10			15				■	■	■	■	■	■
		15			15				■	■	■	■	■	■
		15			30					■	■	■	■	■
		30			30					■	■	■	■	■
1	FS5	5	10P	10	5			■	■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		10			15				■	■	■	■	■	■
		15			15				■	■	■	■	■	■
		15			30					■	■	■	■	■
		30			30					■	■	■	■	■

■ Feasible (other combinations on request)

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M A 7 ■ ■ 8 – ■ ■ ■ ■ ■ ■ – ■ ■ ■ ■ ★ ■ ■

s. p. 40 s. p. 40 s. p. 40

10th position	11th position	12th position	13th position	14th position	15th position	16th position
	0	1				
	2	3				
	4	5				
	7	8				
C	2		–	0	A	
C	3		–	0	A	
E	2		–	0	A	
E	3		–	0	A	
E	4		–	0	A	
H	2		–	0	A	
H	3		–	0	A	
H	4		–	0	A	
L	1		–	0	A	
L	2		–	0	A	
L	3		–	0	A	
L	4		–	0	A	
Q	1		–	0	A	
Q	2		–	0	A	
Q	3		–	0	A	
Q	4		–	0	A	
E	1		–	1	L	
E	2		–	2	L	
E	3		–	3	L	
E	4		–	4	L	
E	1		–	1	Q	
E	2		–	2	Q	
E	3		–	3	Q	
E	4		–	4	Q	
H	1		–	1	L	
H	2		–	2	L	
H	2		–	3	L	
H	3		–	3	L	
H	3		–	4	L	
H	4		–	4	L	
H	1		–	1	Q	
H	2		–	2	Q	
H	2		–	3	Q	
H	3		–	3	Q	
H	3		–	4	Q	
H	4		–	4	Q	

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 20 kA, I_{PN} = 100 A)
Thermal strength 200 x I_{PN}
1st core class 1; instrument security factor FS5; rating 10 VA
2nd core class 5P; accuracy limit factor 10; rating 15 VA

4 M A 7 2 4 8 – 0 M 2 H 2 2 – 3 1

Example for Order No.: 4 M A 7 2 4 8 – 0 M H 2 2 – 3 1 ■ ■

Order codes:

20 kA – with primary multi-ratio

Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16		Order codes
Order No.:	4	M	A	7	■	4	8	–	■	■	■	■	■	–	■	■	■	■	– ★	■ ■ ■
																	s.p. 40	s.p. 40		s.p. 40

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength	Position 12
2x 200 A 2x 250 A 2x 300 A 2x 400 A 2x 500 A 2x 600 A	100 x I_{PN}	0
2x 150 A	150 x I_{PN}	1
2x 100 A 2x 125 A	200 x I_{PN}	2
2x 75 A	300 x I_{PN}	3
2x 50 A 2x 60 A	400 x I_{PN}	4
2x 40 A	500 x I_{PN}	5
2x 30 A	800 x I_{PN}	7
2x 25 A	1000 x I_{PN}	B

1st core Class	1st core Factor	1st core VA rating	2nd core Class	2nd core Factor	2nd core VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}	Order code
0.2	FS10	10								■	■	■	■	■	C 2 – 0 A
		15								■	■	■	■	■	C 3 – 0 A
0.5	FS5	10				■	■		■	■	■	■	■	■	E 2 – 0 A
		15							■	■	■	■	■	■	E 3 – 0 A
		30								■	■	■	■	■	E 4 – 0 A
1	FS5	10				■	■		■	■	■	■	■	■	H 2 – 0 A
		15				■	■		■	■	■	■	■	■	H 3 – 0 A
		30							■	■	■	■	■	■	H 4 – 0 A
5P	10	5				■	■		■	■	■	■	■	■	L 1 – 0 A
		10							■	■	■	■	■	■	L 2 – 0 A
		15								■	■	■	■	■	L 3 – 0 A
		30										■	■	■	L 4 – 0 A
10P	10	5				■	■		■	■	■	■	■	■	Q 1 – 0 A
		10					■		■	■	■	■	■	■	Q 2 – 0 A
		15							■	■	■	■	■	■	Q 3 – 0 A
		30										■	■	■	Q 4 – 0 A
0.5	FS5	5	5P	10	5				■	■	■	■	■	■	E 1 – 1 L
		10			10						■	■	■	■	E 2 – 2 L
		15			15							■	■	■	E 3 – 3 L
		30			30								■	■	E 4 – 4 L
0.5	FS5	5	10P	10	5				■	■	■	■	■	■	E 1 – 1 Q
		10			10				■		■	■	■	■	E 2 – 2 Q
		15			15							■	■	■	E 3 – 3 Q
		30			30								■	■	E 4 – 4 Q
1	FS5	5	5P	10	5	■	■		■	■	■	■	■	■	H 1 – 1 L
		10			10					■	■	■	■	■	H 2 – 2 L
		10			15						■	■	■	■	H 2 – 3 L
		15			15						■	■	■	■	H 3 – 3 L
		15			30								■	■	H 3 – 4 L
		30			30								■	■	H 4 – 4 L
1	FS5	5	10P	10	5	■	■		■	■	■	■	■	■	H 1 – 1 Q
		10			10					■	■	■	■	■	H 2 – 2 Q
		10			15						■	■	■	■	H 2 – 3 Q
		15			15						■	■	■	■	H 3 – 3 Q
		15			30								■	■	H 3 – 4 Q
		30			30								■	■	H 4 – 4 Q

■ Feasible (other combinations on request)

Configuration example

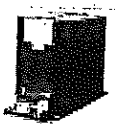
Indoor support-type current transformer, block-type design — 4MA7
(U_m = 12 kV, I_{th} = 20 kA, I_{PN} = 2x 100 A) — 248-3M
Thermal strength 200 x I_{PN} — 2
1st core class 1; instrument security factor FS5; rating 5 VA — H1 – 1Q
2nd core class 10P; accuracy limit factor 10; rating 5 VA

Example for Order No.: 4MA7248-3MH12-1Q ■ ■

Order codes:

ВЯРНО С ОРИГИНАЛА

СОФИЯ MIG 23 LTD



25 kA

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength
250 A 300 A 400 A 500 A 600 A 750 A 1000 A 1200 A 1250 A 1500 A 2000 A 2500 A	100 x I_{PN}
200 A	150 x I_{PN}
125 A 150 A	200 x I_{PN}
100 A	300 x I_{PN}
75 A	400 x I_{PN}
50 A 60 A	500 x I_{PN}
40 A	800 x I_{PN}

1st core			2nd core			Thermal strength							
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10												■
		15												■
0.5	FS5	10												■
		15												■
		30												■
1	FS5	10												■
		15												■
		30												■
5P	10	5												■
		10												■
		15												■
		30												■
10P	10	5												■
		10												■
		15												■
		30												■
0.5	FS5	5	5P	10	5									■
		10			10									■
		15			15									■
		30			30									■
0.5	FS5	5	10P	10	5									■
		10			10									■
		15			15									■
		30			30									■
1	FS5	5	5P	10	5									■
		10			10									■
		10			15									■
		15			15									■
		15			30									■
		30			30									■
1	FS5	5	10P	10	5									■
		10			10									■
		10			15									■
		15			15									■
		15			30									■
		30			30									■

■ Feasible (other combinations on request)

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M A 7 ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ ■ ■

s.p. 40 s.p. 40 s.p. 40

10th position	
0	1
2	3
4	5
7	

11th position	12th position	13th position	14th position	15th position	16th position
C	2	–	0	A	
C	3	–	0	A	
E	2	–	0	A	
E	3	–	0	A	
E	4	–	0	A	
H	2	–	0	A	
H	3	–	0	A	
H	4	–	0	A	
L	1	–	0	A	
L	2	–	0	A	
L	3	–	0	A	
L	4	–	0	A	
Q	1	–	0	A	
Q	2	–	0	A	
Q	3	–	0	A	
Q	4	–	0	A	
E	1	–	1	L	
E	2	–	2	L	
E	3	–	3	L	
E	4	–	4	L	
E	1	–	1	Q	
E	2	–	2	Q	
E	3	–	3	Q	
E	4	–	4	Q	
H	1	–	1	L	
H	2	–	2	L	
H	2	–	3	L	
H	3	–	3	L	
H	3	–	4	L	
H	4	–	4	L	
H	1	–	1	Q	
H	2	–	2	Q	
H	2	–	3	Q	
H	3	–	3	Q	
H	3	–	4	Q	
H	4	–	4	Q	

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 25 kA, I_{PN} = 100 A)
Thermal strength 300 x I_{PN}
1st core class 10P; instrument security factor 10; rating 15 VA
2nd core without

4 M A 7 2 5 4 – 0 M Q 3 3 – 0 A

Example for Order No.: 4 M A 7 2 5 4 – 0 M Q 3 3 – 0 A ■ ■

Order codes:

25 kA – with primary multi-ratio

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength
2x 250 A 2x 300 A 2x 400 A 2x 500 A 2x 600 A	100 x I_{PN}
2x 200 A	150 x I_{PN}
2x 125 A 2x 150 A	200 x I_{PN}
2x 100 A	300 x I_{PN}
2x 75 A	400 x I_{PN}
2x 50 A 2x 60 A	500 x I_{PN}
2x 40 A	800 x I_{PN}

1st core			2nd core			Thermal strength							
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10												
		15												
0.5	FS5	10												
		15												
		30												
1	FS5	10												
		15												
		30												
5P	10	5												
		10												
		15												
		30												
10P	10	5												
		10												
		15												
		30												
0.5	FS5	5	5P	10	5									
		10			10									
		15			15									
		30			30									
0.5	FS5	5	10P	10	5									
		10			10									
		15			15									
		30			30									
1	FS5	5	5P	10	5									
		10			10									
		10			15									
		15			15									
		15			30									
		30			30									
1	FS5	5	10P	10	5									
		10			10									
		10			15									
		15			15									
		15			30									
		30			30									

■ Feasible (other combinations on request)

Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	–	Order codes
Order No.:	4	M	A	7	■	■	■	–	■	■	■	■	■	–	■	■	■	■	–	■ ■ ■
																	s. p. 40	s. p. 40	s. p. 40	
													0							
													1							
													2							
													3							
													4							
													5							
													7							
											C	2		–	0	A			
											C	3		–	0	A			
											E	2		–	0	A			
											E	3		–	0	A			
											E	4		–	0	A			
											H	2		–	0	A			
											H	3		–	0	A			
											H	4		–	0	A			
											L	1		–	0	A			
											L	2		–	0	A			
											L	3		–	0	A			
											L	4		–	0	A			
											Q	1		–	0	A			
											Q	2		–	0	A			
											Q	3		–	0	A			
											Q	4		–	0	A			
											E	1		–	1	L			
											E	2		–	2	L			
											E	3		–	3	L			
											E	4		–	4	L			
											E	1		–	1	Q			
											E	2		–	2	Q			
											E	3		–	3	Q			
											E	4		–	4	Q			
											H	1		–	1	L			
											H	2		–	2	L			
											H	2		–	3	L			
											H	3		–	3	L			
											H	3		–	4	L			
											H	4		–	4	L			
											H	1		–	1	Q			
											H	2		–	2	Q			
											H	2		–	3	Q			
											H	3		–	3	Q			
											H	3		–	4	Q			
											H	4		–	4	Q			

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 25 kA, I_{PN} = 2x 100 A)
Thermal strength 300 x I_{PN}
1st core class 10P; instrument security factor 10; rating 15 VA
2nd core without

	4	M	A	7	2	5	4	–	3	M	Q	3	3	–	0	A	■	■
Example for Order No.:																		
Order codes:																		

31.5 kA

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength
400 A 500 A 600 A 750 A 1000 A 1200 A 1250 A 1500 A 2000 A 2500 A	100 x I_{PN}
250 A 300 A	150 x I_{PN}
200 A	200 x I_{PN}
125 A 150 A	300 x I_{PN}
100 A	400 x I_{PN}
75 A	500 x I_{PN}
60 A	600 x I_{PN}
50 A	800 x I_{PN}
40 A	1000 x I_{PN}

1st core			2nd core			Thermal strength								
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10												
		15												
0.5	FS5	10												
		15												
		30												
1	FS5	10												
		15												
		30												
5P	10	5												
		10												
		15												
		30												
10P	10	5												
		10												
		15												
		30												
0.5	FS5	5	5P	10	5									
		10			10									
		15			15									
		30			30									
0.5	FS5	5	10P	10	5									
		10			10									
		15			15									
		30			30									
1	FS5	5	5P	10	5									
		10			10									
		10			15									
		15			15									
		15			30									
		30			30									
1	FS5	5	10P	10	5									
		10			10									
		15			15									
		15			15									
		30			30									

■ Feasible (other combinations on request)

Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16	
Order No.:	4	M	A	7	■	5	7	–	■	■	■	■	■	–	■	■	■	■	Order codes
																	s. p. 40	s. p. 40	s. p. 40
											0								
											1								
											2								
											3								
											4								
											5								
											6								
											7								
											8								
											C	2		–	0	A			
											C	3		–	0	A			
											E	2		–	0	A			
											E	3		–	0	A			
											E	4		–	0	A			
											H	2		–	0	A			
											H	3		–	0	A			
											H	4		–	0	A			
											L	1		–	0	A			
											L	2		–	0	A			
											L	3		–	0	A			
											L	4		–	0	A			
											Q	1		–	0	A			
											Q	2		–	0	A			
											Q	3		–	0	A			
											Q	4		–	0	A			
											E	1		–	1	L			
											E	2		–	2	L			
											E	3		–	3	L			
											E	4		–	4	L			
											E	1		–	1	Q			
											E	2		–	2	Q			
											E	3		–	3	Q			
											E	4		–	4	Q			
											H	1		–	1	L			
											H	2		–	2	L			
											H	2		–	3	L			
											H	3		–	3	L			
											H	3		–	4	L			
											H	4		–	4	L			
											H	1		–	1	Q			
											H	2		–	2	Q			
											H	2		–	3	Q			
											H	3		–	3	Q			
											H	3		–	4	Q			
											H	4		–	4	Q			

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 31.5 kA, I_{PN} = 100 A)
Thermal strength 400 x I_{PN}
1st core class 0.2; instrument security factor FS10; rating 15 VA
2nd core without

	4	M	A	7	2	5	7	–	0	M										
															4					
											C	3		–	0	A				
Example for Order No.:	4	M	A	7	2	5	7	–	0	M	C	3	4	–	0	A				
Order codes:																				

31.5 kA – with primary multi-ratio

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength	Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16	Order codes
		Order No.: 4 M A 7 ■ 5 7 – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★	■ ■ ■
			s. p. 40 s. p. 40 s. p. 40
2x 300 A 2x 400 A 2x 500 A 2x 600 A	100 x I_{PN}	0	
250 A 300 A	150 x I_{PN}	1	
200 A	200 x I_{PN}	2	
125 A 150 A	300 x I_{PN}	3	
100 A	400 x I_{PN}	4	
75 A	500 x I_{PN}	5	
60 A	600 x I_{PN}	6	
50 A	800 x I_{PN}	7	
40 A	1000 x I_{PN}	8	

1st core			2nd core			Thermal strength									
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}	
0.2	FS10	10						■	■	■	■	■	■	■	C 2 – 0 A
		15						■	■	■	■	■	■	■	C 3 – 0 A
0.5	FS5	10					■	■	■	■	■	■	■	■	E 2 – 0 A
		15					■	■	■	■	■	■	■	■	E 3 – 0 A
		30						■	■	■	■	■	■	■	E 4 – 0 A
1	FS5	10					■	■	■	■	■	■	■	■	H 2 – 0 A
		15					■	■	■	■	■	■	■	■	H 3 – 0 A
		30						■	■	■	■	■	■	■	H 4 – 0 A
5P	10	5					■	■	■	■	■	■	■	■	L 1 – 0 A
		10						■	■	■	■	■	■	■	L 2 – 0 A
		15							■	■	■	■	■	■	L 3 – 0 A
		30								■	■	■	■	■	L 4 – 0 A
10P	10	5					■	■	■	■	■	■	■	■	Q 1 – 0 A
		10						■	■	■	■	■	■	■	Q 2 – 0 A
		15							■	■	■	■	■	■	Q 3 – 0 A
		30								■	■	■	■	■	Q 4 – 0 A
0.5	FS5	5	5P	10	5			■	■	■	■	■	■	■	E 1 – 1 L
		10			10				■	■	■	■	■	■	E 2 – 2 L
		15			15					■	■	■	■	■	E 3 – 3 L
		30			30						■	■	■	■	E 4 – 4 L
0.5	FS5	5	10P	10	5			■	■	■	■	■	■	■	E 1 – 1 Q
		10			10				■	■	■	■	■	■	E 2 – 2 Q
		15			15					■	■	■	■	■	E 3 – 3 Q
		30			30						■	■	■	■	E 4 – 4 Q
1	FS5	5	5P	10	5		■	■	■	■	■	■	■	■	H 1 – 1 L
		10			10				■	■	■	■	■	■	H 2 – 2 L
		10			15					■	■	■	■	■	H 2 – 3 L
		15			15					■	■	■	■	■	H 3 – 3 L
		15			30						■	■	■	■	H 3 – 4 L
		30			30						■	■	■	■	H 4 – 4 L
1	FS5	5	10P	10	5		■	■	■	■	■	■	■	■	H 1 – 1 Q
		10			10				■	■	■	■	■	■	H 2 – 2 Q
		10			15					■	■	■	■	■	H 2 – 3 Q
		15			15					■	■	■	■	■	H 3 – 3 Q
		15			30						■	■	■	■	H 3 – 4 Q
		30			30						■	■	■	■	H 4 – 4 Q

■ Feasible (other combinations on request)

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 31.5 kA, I_{PN} = 2x 100 A)
Thermal strength 400 x I_{PN}
1st core class 0.5; instrument security factor FS5; rating 5 VA
2nd core class 10P; accuracy limit factor 10; rating 5 VA

4 M A 7 2 5 7 – 3 M 4 E 2 – 1 Q

Example for Order No.: 4 M A 7 2 5 7 – 3 M E 4 E 2 – 1 Q ■ ■
Order codes:

40 kA

10th to 14th position
Core versions

At rated primary current I_{PN}	Thermal strength
400 A 500 A 600 A 750 A 1000 A 1200 A 1250 A 1500 A 2000 A 2500 A	100 x I_{PN}
300 A	150 x I_{PN}
200 A 250 A	200 x I_{PN}
150 A	300 x I_{PN}
100 A 125 A	400 x I_{PN}
75 A	600 x I_{PN}
60 A	800 x I_{PN}
50 A	1000 x I_{PN}

1st core			2nd core			Thermal strength								
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10						■		■	■	■	■	■
		15								■	■	■	■	■
0.5	FS5	10					■	■	■	■	■	■	■	■
		15					■	■	■	■	■	■	■	■
		30								■	■	■	■	■
1	FS5	10					■	■	■	■	■	■	■	■
		15					■	■	■	■	■	■	■	■
		30								■	■	■	■	■
5P	10	5					■	■	■	■	■	■	■	■
		10								■	■	■	■	■
		15								■	■	■	■	■
		30									■	■	■	■
10P	10	5					■	■	■	■	■	■	■	■
		10						■	■	■	■	■	■	■
		15							■	■	■	■	■	■
		30									■	■	■	■
0.5	FS5	5	5P	10	5	■	■	■	■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		15			15						■	■	■	■
		30			30									■
0.5	FS5	5	10P	10	5	■	■	■		■	■	■	■	■
		10			10					■	■	■	■	■
		15			15						■	■	■	■
		30			30									■
1	FS5	5	5P	10	5	■	■	■		■	■	■	■	■
		10			10					■	■	■	■	■
		10			15						■	■	■	■
		15			15						■	■	■	■
		15			30									■
		30			30									■
1	FS5	5	10P	10	5	■	■	■		■	■	■	■	■
		10			10					■	■	■	■	■
		10			15						■	■	■	■
		15			15						■	■	■	■
		15			30									■
		30			30									■

■ Feasible (other combinations on request)

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M A 7 ■ 6 3 – ■ ■ ■ ■ ■ – ■ ■ s. p. 40 s. p. 40 – s. p. 40 ■ ■ ■

10th position: 0 / 1 / 2 / 3 / 4 / 6 / 7 / 8

11th	12th	13th	14th	15th	16th
C	2	–	0	A	
C	3	–	0	A	
E	2	–	0	A	
E	3	–	0	A	
E	4	–	0	A	
H	2	–	0	A	
H	3	–	0	A	
H	4	–	0	A	
L	1	–	0	A	
L	2	–	0	A	
L	3	–	0	A	
L	4	–	0	A	
Q	1	–	0	A	
Q	2	–	0	A	
Q	3	–	0	A	
Q	4	–	0	A	
E	1	–	1	L	
E	2	–	2	L	
E	3	–	3	L	
E	4	–	4	L	
E	1	–	1	Q	
E	2	–	2	Q	
E	3	–	3	Q	
E	4	–	4	Q	
H	1	–	1	L	
H	2	–	2	L	
H	2	–	3	L	
H	3	–	3	L	
H	3	–	4	L	
H	4	–	4	L	
H	1	–	1	Q	
H	2	–	2	Q	
H	2	–	3	Q	
H	3	–	3	Q	
H	3	–	4	Q	
H	4	–	4	Q	

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 40 kA, I_{PN} = 100 A)
Thermal strength 400 x I_{PN}
1st core class 1; instrument security factor FS5; rating 5 VA
2nd core class 5P; accuracy limit factor 10; rating 5 VA

4 M A 7 2 6 3 – 0 M 4 E 1 4 – 1 L

Example for Order No.: 4 M A 7 2 6 3 – 0 M E 1 4 – 1 L ■ ■
Order codes:

40 kA – with primary multi-ratio

10th to 14th position

Core versions

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 — Order codes

Order No.: 4 M A 7 ■ 6 3 – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★ ■ ■ ■

s. p. 40 | s. p. 40 | s. p. 40

At rated primary current I_{PN}	Thermal strength	Code
2x 400 A 2x 500 2x 600 A	100 x I_{PN}	0
2x 300 A	150 x I_{PN}	1
2x 200 A 2x 250 A	200 x I_{PN}	2
2x 150 A	300 x I_{PN}	3
2x 100 A 2x 125 A	400 x I_{PN}	4
2x 75 A	600 x I_{PN}	6
2x 60 A	800 x I_{PN}	7
2x 50 A	1000 x I_{PN}	8

1st core Class	1st core Factor	1st core VA rating	2nd core Class	2nd core Factor	2nd core VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}	Order code
0.2	FS10	10						■		■	■	■	■	■	C 2 – 0 A
		15								■	■	■	■	■	C 3 – 0 A
0.5	FS5	10				■	■	■		■	■	■	■	■	E 2 – 0 A
		15					■	■		■	■	■	■	■	E 3 – 0 A
		30						■		■	■	■	■	■	E 4 – 0 A
1	FS5	10				■	■	■		■	■	■	■	■	H 2 – 0 A
		15				■	■	■		■	■	■	■	■	H 3 – 0 A
		30						■		■	■	■	■	■	H 4 – 0 A
5P	10	5				■	■	■		■	■	■	■	■	L 1 – 0 A
		10						■		■	■	■	■	■	L 2 – 0 A
		15								■	■	■	■	■	L 3 – 0 A
		30										■	■	■	L 4 – 0 A
10P	10	5				■	■	■		■	■	■	■	■	Q 1 – 0 A
		10					■	■		■	■	■	■	■	Q 2 – 0 A
		15						■		■	■	■	■	■	Q 3 – 0 A
		30									■	■	■	■	Q 4 – 0 A
0.5	FS5	5	5P	10	5		■	■		■	■	■	■	■	E 1 – 1 L
		10			10						■	■	■	■	E 2 – 2 L
		15			15							■	■	■	E 3 – 3 L
		30			30								■	■	E 4 – 4 L
0.5	FS5	5	10P	10	5		■	■		■	■	■	■	■	E 1 – 1 Q
		10			10					■	■	■	■	■	E 2 – 2 Q
		15			15							■	■	■	E 3 – 3 Q
		30			30								■	■	E 4 – 4 Q
1	FS5	5	5P	10	5	■	■	■		■	■	■	■	■	H 1 – 1 L
		10			10					■	■	■	■	■	H 2 – 2 L
		10			15						■	■	■	■	H 2 – 3 L
		15			15						■	■	■	■	H 3 – 3 L
		15			30								■	■	H 3 – 4 L
		30			30								■	■	H 4 – 4 L
1	FS5	5	10P	10	5	■	■	■		■	■	■	■	■	H 1 – 1 Q
		10			10					■	■	■	■	■	H 2 – 2 Q
		10			15						■	■	■	■	H 2 – 3 Q
		15			15						■	■	■	■	H 3 – 3 Q
		15			30								■	■	H 3 – 4 Q
		30			30								■	■	H 4 – 4 Q

■ Feasible (other combinations on request)

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 40 kA, I_{PN} = 2x 100 A)
Thermal strength 400 x I_{PN}
1st core class 0.2; instrument security factor FS10; rating 10 VA
2nd core without

4 M A 7
2 6 3 – 3 M
4
C 2 – 0 A

Example for Order No.: 4 M A 7 2 6 3 – 3 M C 2 4 – 0 A

Order codes:

ВЯРНО С ОРИГИНАЛА

СОФИЯ MIG 23 LTD

50 kA

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength
500 A 600 A 750 A 1000 A 1200 A 1250 A 1500 A 2000 A 2500 A	100 x I_{PN}
400 A	150 x I_{PN}
250 A 300 A	200 x I_{PN}
200 A	300 x I_{PN}
125 A 150 A	400 x I_{PN}
100 A	500 x I_{PN}
75 A	800 x I_{PN}
60 A	1000 x I_{PN}

1st core			2nd core			Thermal strength							
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10							■	■	■	■	■	■
		15							■	■	■	■	■	■
0.5	FS5	10						■	■	■	■	■	■	■
		15						■	■	■	■	■	■	■
		30							■	■	■	■	■	■
1	FS5	10						■	■	■	■	■	■	■
		15						■	■	■	■	■	■	■
		30						■	■	■	■	■	■	■
5P	10	5						■	■	■	■	■	■	■
		10							■	■	■	■	■	■
		15								■	■	■	■	■
		30									■	■	■	■
10P	10	5						■	■	■	■	■	■	■
		10						■	■	■	■	■	■	■
		15								■	■	■	■	■
		30									■	■	■	■
0.5	FS5	5	5P	10	5				■	■	■	■	■	■
		10			10					■	■	■	■	■
		15			15						■	■	■	■
		30			30									■
0.5	FS5	5	10P	10	5			■	■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		15			15					■	■	■	■	■
		30			30									■
1	FS5	5	5P	10	5			■	■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		10			15					■	■	■	■	■
		15			15					■	■	■	■	■
		15			30							■	■	■
		30			30									■
1	FS5	5	10P	10	5			■	■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		10			15					■	■	■	■	■
		15			15					■	■	■	■	■
		15			30							■	■	■
		30			30									■

■ Feasible (other combinations on request)

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 50 kA, I_{PN} = 100 A)
Thermal strength 500 x I_{PN}
1st core class 0.5; instrument security factor FS5; rating 5 VA
2nd core class 5P; accuracy limit factor 10; rating 5 VA

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M A 7 ■ 6 7 – ■ ■ ■ ■ ■ – ■ ■ ■ – ■ ■ ■ ■ – ■ ■

s. p. 40 s. p. 40 s. p. 40

10	11	12		13	14	15	16	
0	1							
2	3							
4	5							
7	8							
C	2		–	0	A			
C	3		–	0	A			
E	2		–	0	A			
E	3		–	0	A			
E	4		–	0	A			
H	2		–	0	A			
H	3		–	0	A			
H	4		–	0	A			
L	1		–	0	A			
L	2		–	0	A			
L	3		–	0	A			
L	4		–	0	A			
Q	1		–	0	A			
Q	2		–	0	A			
Q	3		–	0	A			
Q	4		–	0	A			
E	1		–	1	L			
E	2		–	2	L			
E	3		–	3	L			
E	4		–	4	L			
E	1		–	1	Q			
E	2		–	2	Q			
E	3		–	3	Q			
E	4		–	4	Q			
H	1		–	1	L			
H	2		–	2	L			
H	2		–	3	L			
H	3		–	3	L			
H	3		–	4	L			
H	4		–	4	L			
H	1		–	1	Q			
H	2		–	2	Q			
H	2		–	3	Q			
H	3		–	3	Q			
H	3		–	4	Q			
H	4		–	4	Q			
		5						
E	1		–	1	L			

4 M A 7 2 6 7 – 0 M

Example for Order No.: 4 M A 7 2 6 7 – 0 M E 1 5 – 1 L ■ ■

Order codes:

50 kA – with primary multi-ratio

10th to 14th position
Core versions

At rated primary current I_{PN}	Thermal strength
2x 500 A 2x 600 A	100 x I_{PN}
2x 400 A	150 x I_{PN}
2x 250 A 2x 300 A	200 x I_{PN}
2x 200 A	300 x I_{PN}
2x 125 A 2x 150 A	400 x I_{PN}
2x 100 A	500 x I_{PN}
2x 75 A	800 x I_{PN}
2x 50 A 2x 60 A	1000 x I_{PN}

1st core			2nd core			Thermal strength									
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10							■	■	■	■	■	■
		15							■	■	■	■	■	■
0.5	FS5	10					■	■	■	■	■	■	■	■
		15					■	■	■	■	■	■	■	■
		30							■	■	■	■	■	■
1	FS5	10					■	■	■	■	■	■	■	■
		15					■	■	■	■	■	■	■	■
		30							■	■	■	■	■	■
5P	10	5					■	■	■	■	■	■	■	■
		10							■	■	■	■	■	■
		15								■	■	■	■	■
		30									■	■	■	■
10P	10	5					■	■	■	■	■	■	■	■
		10							■	■	■	■	■	■
		15								■	■	■	■	■
		30									■	■	■	■
0.5	FS5	5	5P	10	5		■		■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		15			15						■	■	■	■
		30			30						■	■	■	■
0.5	FS5	5	10P	10	5		■		■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		15			15						■	■	■	■
		30			30						■	■	■	■
1	FS5	5	5P	10	5		■		■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		10			15						■	■	■	■
		15			15						■	■	■	■
		15			30								■	■
		30			30								■	■
1	FS5	5	10P	10	5		■		■	■	■	■	■	■
		10			10				■	■	■	■	■	■
		10			15						■	■	■	■
		15			15						■	■	■	■
		15			30								■	■
		30			30								■	■

■ Feasible (other combinations on request)

Configuration example
Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 50 kA, I_{PN} = 2x 100 A)
Thermal strength 500 x I_{PN}
1st core class 0.5; instrument security factor FS5; rating 5 VA
2nd core class 5P; accuracy limit factor 10; rating 5 VA

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M A 7 ■ 6 7 – ■ ■ ■ ■ ■ – ■ ■ s. p. 40 s. p. 40 – s. p. 40 ★ ■ ■ ■

10	11	12	13	14	15	16
		0				
		1				
		2				
		3				
		4				
		5				
		7				
		8				
C	2		–	0	A	
C	3		–	0	A	
E	2		–	0	A	
E	3		–	0	A	
E	4		–	0	A	
H	2		–	0	A	
H	3		–	0	A	
H	4		–	0	A	
L	1		–	0	A	
L	2		–	0	A	
L	3		–	0	A	
L	4		–	0	A	
Q	1		–	0	A	
Q	2		–	0	A	
Q	3		–	0	A	
Q	4		–	0	A	
E	1		–	1	L	
E	2		–	2	L	
E	3		–	3	L	
E	4		–	4	L	
E	1		–	1	Q	
E	2		–	2	Q	
E	3		–	3	Q	
E	4		–	4	Q	
H	1		–	1	L	
H	2		–	2	L	
H	2		–	3	L	
H	3		–	3	L	
H	3		–	4	L	
H	4		–	4	L	
H	1		–	1	Q	
H	2		–	2	Q	
H	2		–	3	Q	
H	3		–	3	Q	
H	3		–	4	Q	
H	4		–	4	Q	

4 M A 7 2 6 7 – 3 M 5 E 1 – 1 L

Example for Order No.: 4 M A 7 2 6 7 – 3 M E 1 5 – 1 L ■ ■

Order codes:

63 kA

10th to 14th position
Core versions

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 — Order codes
Order No.: 4 M A 7 ■ 7 1 – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★ ■ ■ ■

(15: s. p. 40; 16: s. p. 40; ★: s. p. 40)

At rated primary current I_{PN}	Thermal strength	Position 12
750 A 1000 A 1200 A 1250 A 1500 A 2000 A 2500 A	100 x I_{PN}	0
500 A 600 A	150 x I_{PN}	1
400 A	200 x I_{PN}	2
250 A 300 A	300 x I_{PN}	3
200 A	400 x I_{PN}	4
125 A 150 A	500 x I_{PN}	5
100 A	800 x I_{PN}	7
75 A	1000 x I_{PN}	8

2

1st core Class	1st core Factor	1st core VA rating	2nd core Class	2nd core Factor	2nd core VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}	Position 10 11 12 – 13 14
0.2	FS10	10							■	■	■	■	■	■	C 2 – 0 A
		15								■	■	■	■	■	C 3 – 0 A
0.5	FS5	10				■	■		■	■	■	■	■	■	E 2 – 0 A
		15					■		■	■	■	■	■	■	E 3 – 0 A
		30							■	■	■	■	■	■	E 4 – 0 A
1	FS5	10				■	■		■	■	■	■	■	■	H 2 – 0 A
		15				■	■		■	■	■	■	■	■	H 3 – 0 A
		30							■	■	■	■	■	■	H 4 – 0 A
5P	10	5				■	■		■	■	■	■	■	■	L 1 – 0 A
		10							■	■	■	■	■	■	L 2 – 0 A
		15								■	■	■	■	■	L 3 – 0 A
		30										■	■	■	L 4 – 0 A
10P	10	5				■	■		■	■	■	■	■	■	Q 1 – 0 A
		10					■		■	■	■	■	■	■	Q 2 – 0 A
		15							■	■	■	■	■	■	Q 3 – 0 A
		30									■	■	■	■	Q 4 – 0 A
0.5	FS5	5	5P	10	5		■		■	■	■	■	■	■	E 1 – 1 L
		10			10					■	■	■	■	■	E 2 – 2 L
		15			15							■	■	■	E 3 – 3 L
		30			30									■	E 4 – 4 L
0.5	FS5	5	10P	10	5		■		■	■	■	■	■	■	E 1 – 1 Q
		10			10					■	■	■	■	■	E 2 – 2 Q
		15			15							■	■	■	E 3 – 3 Q
		30			30									■	E 4 – 4 Q
1	FS5	5	5P	10	5		■		■	■	■	■	■	■	H 1 – 1 L
		10			10					■	■	■	■	■	H 2 – 2 L
		10			15					■	■	■	■	■	H 2 – 3 L
		15			15						■	■	■	■	H 3 – 3 L
		15			30								■	■	H 3 – 4 L
		30			30									■	H 4 – 4 L
1	FS5	5	10P	10	5		■		■	■	■	■	■	■	H 1 – 1 Q
		10			10				■	■	■	■	■	■	H 2 – 2 Q
		10			15					■	■	■	■	■	H 2 – 3 Q
		15			15						■	■	■	■	H 3 – 3 Q
		15			30							■	■	■	H 3 – 4 Q
		30			30								■	■	H 4 – 4 Q

■ Feasible (other combinations on request)

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 63 kA, I_{PN} = 100 A) — 4 M A 7
Thermal strength 800 x I_{PN} — 2 7 1 – 0 M … 7
1st core class 0.5; instrument security factor FS5; rating 15 VA
2nd core without — E 3 – 0 A

Example for Order No.: 4 M A 7 2 7 1 – 0 M E 3 7 – 0 A ■ ■
Order codes:

63 kA – with primary multi-ratio

10th to 14th position

Core versions

At rated primary current I_{PN}	Thermal strength
2x 500 A 2x 600 A	150 x I_{PN}
2x 400 A	200 x I_{PN}
2x 250 A 2x 300 A	300 x I_{PN}
2x 200 A	400 x I_{PN}
2x 125 A 2x 150 A	500 x I_{PN}
2x 100 A	800 x I_{PN}
2x 75 A	1000 x I_{PN}

1st core			2nd core			Thermal strength								
Class	Factor	VA rating	Class	Factor	VA rating	1000 x I_{PN}	800 x I_{PN}	600 x I_{PN}	500 x I_{PN}	400 x I_{PN}	300 x I_{PN}	200 x I_{PN}	150 x I_{PN}	100 x I_{PN}
0.2	FS10	10							■	■	■	■	■	
		15								■	■	■	■	
0.5	FS5	10					■	■	■	■	■	■	■	
		15						■	■	■	■	■	■	
		30							■	■	■	■	■	
1	FS5	10					■	■	■	■	■	■	■	
		15					■	■	■	■	■	■	■	
		30								■	■	■	■	
5P	10	5					■	■	■	■	■	■	■	
		10							■	■	■	■	■	
		15							□	■	■	■	■	
		30										■	■	
10P	10	5					■	■	■	■	■	■	■	
		10						■	■	■	■	■	■	
		15							■	■	■	■	■	
		30									■	■	■	
0.5	FS5	5	5P	10	5		■		■	■	■	■	■	
		10			10					■	■	■	■	
		15			15							■	■	
		30			30								■	
0.5	FS5	5	10P	10	5		■		■	■	■	■	■	
		10			10					■	■	■	■	
		15			15							■	■	
		30			30								■	
1	FS5	5	5P	10	5		■		■	■	■	■	■	
		10			10					■	■	■	■	
		10			15					■	■	■	■	
		15			15						■	■	■	
		15			30								■	
		30			30									
1	FS5	5	10P	10	5		■		■	■	■	■	■	
		10			10					■	■	■	■	
		10			15					■	■	■	■	
		15			15						■	■	■	
		15			30								■	
		30			30									

■ Feasible (other combinations on request) □ Not for 2x 125 A

Configuration example

Indoor support-type current transformer, block-type design
(U_m = 12 kV, I_{th} = 63 kA, I_{PN} = 2x 100 A)
Thermal strength 800 x I_{PN}
1st core class 0.5; instrument security factor FS5; rating 5 VA
2nd core class 10P; accuracy limit factor 10; rating 5 VA

Position:	1	2	3	4	5	6	7	–	8	9	10	11	12	–	13	14	15	16		Order codes
Order No.:	4	M	A	7	■	7	1	–	■	■	■	■	■	–	■	■	■	■	–	■ ■ ■
																	s. p. 40	s. p. 40	s. p. 40	

10th position	11th position	12th position	13th position	14th position	15th position	16th position
		1				
		2				
		3				
		4				
		5				
		7				
		8				
C	2		–	0	A	
C	3		–	0	A	
E	2		–	0	A	
E	3		–	0	A	
E	4		–	0	A	
H	2		–	0	A	
H	3		–	0	A	
H	4		–	0	A	
L	1		–	0	A	
L	2		–	0	A	
L	3		–	0	A	
L	4		–	0	A	
Q	1		–	0	A	
Q	2		–	0	A	
Q	3		–	0	A	
Q	4		–	0	A	
E	1		–	1	L	
E	2		–	2	L	
E	3		–	3	L	
E	4		–	4	L	
E	1		–	1	Q	
E	2		–	2	Q	
E	3		–	3	Q	
E	4		–	4	Q	
H	1		–	1	L	
H	2		–	2	L	
H	2		–	3	L	
H	3		–	3	L	
H	3		–	4	L	
H	4		–	4	L	
H	1		–	1	Q	
H	2		–	2	Q	
H	2		–	3	Q	
H	3		–	3	Q	
H	3		–	4	Q	
H	4		–	4	Q	

4	M	A	7																
				2	7	1	–	3	M										
												7							
															E	1		–	1 Q

Example for Order No.: 4 M A 7 2 7 1 – 3 M E 1 7 – 1 Q ■ ■ ■

Order codes:

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M A 7 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ■ ■ ■

15th position
Rated secondary current

Rated current for 1st core	Rated current for 2nd core	
1 A	Without 2nd core	0 A A
5 A	Without 2nd core	0 A B
1 A	1 A	C
5 A	5 A	D
1 A	5 A	E
5 A	1 A	F

16th position
Additional features

Options	
50 Hz, VDE marking	0
50 Hz, IEC marking	1
50 Hz, VDE marking with approval 1)	2
60 Hz, IEC marking	6
Further not listed special versions (only after consultation with the order processing department in the Switchgear Factory Berlin). Information additionally in clear text.	9

1) Only for class 0.2 and 0.5

Special versions

Options		
With routine test certificate in German/English		– Z A 1 0
With capacitive layer for voltage detecting system	6 kV	– Z C 0 6
	10 kV	– Z C 1 0
	15 kV	– Z C 1 5
Differential earth-fault balance in protection core		– Z D 1 0
Other special versions on request		

Configuration example

Indoor support-type current transformer, block-type design
Maximum operating voltage U_m = 12 kV
Rated lightning impulse withstand voltage U_p = 75 kV
Rated short-duration power-frequency withstand voltage U_d = 28 kV
Rated short-time thermal current I_{th} = 63 kA
Rated primary current I_{PN} = 2x 100 A
Thermal strength 800 x I_{PN}
1st core class 0.5; instrument security factor FS5; rating 5 VA
2nd core class 10P; accuracy limit factor 10; rating 5 VA
Rated secondary current 1st core 1A; 2nd core 5A
Power frequency 50 Hz; marking according to IEC
With routine test certificate in German/English
With capacitive layer for voltage detecting system 10 kV

4 M A 7 2 7 1 – 3 M E 1 7 – 1 Q E 1 – Z

Example for Order No.: 4 M A 7 2 7 1 – 3 M E 1 7 – 1 Q E 1 – Z

Order codes: A 1 0 + C 1 0

4MB1 indoor support-type current transformer, single-turn design

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M B 1 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ■ ■ ■

5th position
Operating voltage (maximum value)

Operating voltage U_m kV	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV		
12	75	28	4 M B 1 2	See page 42
17.5	95	38	4 M B 1 3	See page 42
24	128	50	4 M B 1 4	See page 42

6th/7th position
Rated short-time thermal current

Rated short-time thermal current I_{th} kA		
150	7 8	See page 42
200	8 2	See page 42
250	8 4	See page 42
300	8 5	See page 43
500	8 8	See page 43

8th/9th position
Rated primary current

Rated primary current I_N A	Remark	Rated short-time thermal current 150 kA	200 kA	250 kA	300 kA	500 kA		
1500		■					1 D	See page 43
2000			■				1 F	See page 43
2500				■			1 G	See page 43
3000					■		1 H	See page 43
4000						■	1 J	See page 43
5000	Only 4MB13					■	1 K	See page 43
6000	Only 4MB13					■	1 L	See page 43

■ Feasible (other combinations on request)

Configuration example
Indoor support-type current transformer, single-turn design
Maximum operating voltage U_m = 24 kV
Rated lightning impulse withstand voltage U_p = 125 kV
Rated short-duration power-frequency withstand voltage U_d = 50 kV
Rated short-time thermal current I_{th} = 300 kA
Rated primary current I_{PN} = 3000 A

Example for Order No.: 4 M B 1 4 8 5 – ■ 1 H – ■ ■ ■

Order codes:

10th to 14th position
Core versions

At rated primary current I_{PN}	Thermal strength
1500 A 2000 A 2500 A 3000 A 4000 A 5000 A 6000 A	100 x I_{PN}

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes
Order No.: 4 M B 1 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★ ■ ■ ■

See page 43 / See page 43 / See page 43

Position 12: 0

2

1st core Class	1st core Factor	1st core VA rating	2nd core Class	2nd core Factor	2nd core VA rating	1500 A	2000 A	2500 A	3000 A	4000 A	5000 A	6000 A	Order No. pos. 10–14
0.2	FS10	15				■	■	■	■	■	■	■	C 3 – 0 A
		30				■	■	■	■	■	■	■	C 4 – 0 A
0.5	FS10	15				■	■	■	■	■	■	■	F 3 – 0 A
		30				■	■	■	■	■	■	■	F 4 – 0 A
		60				■	■	■	■	■	■	■	F 6 – 0 A
1	FS10	15				■	■	■	■	■	■	■	J 3 – 0 A
		30				■	■	■	■	■	■	■	J 4 – 0 A
		60				■	■	■	■	■	■	■	J 6 – 0 A
5P	10	30				■	■	■	■	■	■	■	L 4 – 0 A
		60				■	■	■	■	■	■	■	L 6 – 0 A
10P	10	30				■	■	■	■	■	■	■	Q 4 – 0 A
		60				■	■	■	■	■	■	■	Q 6 – 0 A
0.5	FS10	15	5P	10	15	■	■	■	■	■	■	■	F 3 – 3 L
		30			30	■	■	■	■	■	■	■	F 4 – 4 L
		30			60						■	■	F 6 – 6 L
1	FS10	15	5P	10	15	■	■	■	■	■	■	■	J 3 – 3 L
		30			30	■	■	■	■	■	■	■	J 4 – 4 L
		60			60						■	■	J 6 – 6 L
0.5	FS10	15	10P	10	15	■	■	■	■	■	■	■	F 3 – 3 Q
		30			30	■	■	■	■	■	■	■	F 4 – 4 Q
		60			60						■	■	F 6 – 6 Q
1	FS10	15	10P	10	15	■	■	■	■	■	■	■	J 3 – 3 Q
		30			30	■	■	■	■	■	■	■	J 4 – 4 Q
		60			60						■	■	J 6 – 6 Q

■ Feasible (other combinations on request)

Configuration example
Indoor support-type current transformer, single-turn design
(U_m = 24 kV, I_{th} = 300 kA, I_{PN} = 3000 A)
Thermal strength 100 x I_{PN}
1st core class **0.5**; instrument security factor **FS10**; rating **30 VA**
2nd core class **5P**; accuracy limit factor **10**; rating **30 VA**

4 M B 1
4 8 5 – 1 H
0
F 4
– 4 L

Example for Order No.: 4 M B 1 4 8 5 – 1 H F 4 0 – 4 L ■ ■
Order codes:

Equipment Selection

4MB1 indoor support-type current transformer, single-turn design

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M B 1 ■ ■ ■ – ■ ■ ■ ■ – ■ ■ ■ ★ ■ ■ ■

15th position
Rated secondary current

Rated current for 1st core	Rated current for 2nd core	
1 A	Without 2nd core	0 A A
5 A	Without 2nd core	0 A B
1 A	1 A	C
5 A	5 A	D
1 A	5 A	E
5 A	1 A	F

16th position
Additional features

Options	
50 Hz, VDE marking	0
50 Hz, IEC marking	1
50 Hz, VDE marking with approval [1]	2
60 Hz, IEC marking	6
Further not listed special versions (only after consultation with the order processing department in the Switchgear Factory Berlin). Information additionally in clear text.	9

1) Only for class 0.2 and 0.5

Special versions

Options	
With routine test certificate in German/English	– Z A 1 0
Other special versions on request	

Configuration example

Indoor support-type current transformer, single-turn design
Maximum operating voltage U_m = 24 kV
Rated lightning impulse withstand voltage U_p = 125 kV
Rated short-duration power-frequency withstand voltage U_d = 50 kV
Rated short-time thermal current I_{th} = 300 kA
Rated primary current I_{PN} = 3000 A
Thermal strength 100 x I_{PN}
1st core class 0.5; instrument security factor FS10; rating 30 VA
2nd core class 5P; accuracy limit factor 10; rating 30 VA
Rated secondary current 1st core 5 A; 2nd core 5 A
Power frequency 60 Hz; marking according to IEC

4 M B 1 4 8 5 – 1 H 0 F 4 – 4 L D 6

Example for Order No.: 4 M B 1 4 8 5 – 1 H F 4 0 – 4 L D 6

Order codes:

4MC2 indoor bushing-type current transformer, single-turn design

5th position
Operating voltage (maximum value)

Operating voltage U_m kV	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16	Order codes
12	75	28	4 M C 2 2	
24	125	50	4 M C 2 4	
36	170	70	4 M C 2 6	

Order No.: 4 M C 2 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ★ ■ ■ ■

See page 45 | See page 45 | See page 45 | See page 45 | See page 45 | See page 46 | See page 46 | See page 46

6th to 9th position
Rated short-time thermal current/ Rated primary current

Rated short-time thermal current I_{th} kA	Rated primary current I_{PN} A	
15	150	4 3 – 0 P
20	200	4 8 – 0 Q
30	300	5 6 – 0 S
40	400	6 3 – 0 T
50	500	6 7 – 0 U
60	600	7 0 – 0 V
80	800	7 3 – 0 X
100	1000	7 5 – 1 A
120	1200	7 6 – 1 B
150	1500	7 8 – 1 D
200	2000	8 2 – 1 F
250	2500	8 4 – 1 G
300	3000	8 5 – 1 H

Configuration example
Indoor bushing-type current transformer, single-turn design
Maximum operating voltage U_m = 36 kV
Rated lightning impulse withstand voltage U_p = 170 kV
Rated short-duration power-frequency withstand voltage U_d = 70 kV
Rated short-time thermal current I_{th} = 50 kA
Rated primary current I_{PN} = 500 A

Example for Order No.: 4 M C 2 6 6 7 – 0 U ■ ■ ■ – ■ ■ ■ ■
Order codes:

4MC2 indoor bushing-type current transformer, single-turn design

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M C 2 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★ ■ ■ ■

See page 46 See page 46 See page 46

10th to 14th position
Core versions

At rated primary current I_{PN}	Thermal strength
150 A 200 A 300 A 400 A 500 A 600 A 800 A 1000 A 1200 A 1500 A 2000 A 2500 A 3000 A	100 x I_{PN}

1st core			2nd core			Rated primary current I_{PN}				
Class	Factor	VA rating	Class	Factor	VA rating	150 A	200 A	300–600 A	800–1500 A	2000–3000 A
0.2	FS10	10				■	■	■	■	■
		15				■	■	■	■	■
0.5	FS5	15				■	■	■	■	■
		30						■	■	■
0.5	FS10	15				■	■	■		
1	FS5	15				■	■	■		
		30						■	■	■
1	FS10	15				■	■	■	■	■
10P	10	15				■	■	■	■	■
		30				■	■	■	■	■
		60						■	■	■
0.2	FS10	10	10P	10	30	■	■	■	■	■
		15			30	■	■	■	■	■
0.5	FS5	15	10P	10	15	■	■	■	■	■
		15			30	■	■	■	■	■
		30			30	■	■	■	■	■
		30			60			■	■	■
0.5	FS10	15	10P	10	15	■	■	■	■	■
		15			30	■	■	■	■	■
1	FS5	15	10P	10	15	■	■	■	■	■
		15			30	■	■	■	■	■
		30			30	■	■	■	■	■
		30			60			■	■	■
1	FS10	15	10P	10	15	■	■	■	■	■
		15			30	■	■	■	■	■

■ Feasible (other combinations on request)

0

C	2	–	0	A
C	3	–	0	A
E	3	–	0	A
E	4	–	0	A
F	3	–	0	A
H	3	–	0	A
H	4	–	0	A
J	3	–	0	A
Q	3	–	0	A
Q	4	–	0	A
Q	6	–	0	A
C	2	–	4	Q
C	3	–	4	Q
E	3	–	3	Q
E	3	–	4	Q
E	4	–	4	Q
E	4	–	6	Q
F	3	–	3	Q
F	3	–	4	Q
H	3	–	3	Q
H	3	–	4	Q
H	4	–	4	Q
H	4	–	6	Q
J	3	–	3	Q
J	3	–	4	Q

Configuration example
Indoor bushing-type current transformer, single-turn design
(U_m = 36 kV, I_{th} = 50 kA, I_{PN} = 500 A)
Thermal strength 100 x I_{PN}
1st core class 1; instrument security factor FS5; rating 30 VA
2nd core class 10P; accuracy limit factor 10; rating 30 VA

4 M C 2 6 6 7 – 0 U H 4 – 4 Q

Example for Order No.: 4 M C 2 6 6 7 – 0 U H 4 – 4 Q ■ ■

Order codes:

15th position
Rated secondary current

Rated current for 1st core	Rated current for 2nd core	
1 A	Without 2nd core	0 A A
5 A	Without 2nd core	0 A B
1 A	1 A	C
5 A	5 A	D
1 A	5 A	E
5 A	1 A	F

16th position
Additional features

Options	
50 Hz, VDE marking	0
50 Hz, IEC marking	1
50 Hz, VDE marking with approval 1)	2
60 Hz, IEC marking	6
Further not listed special versions (only after consultation with the order processing department in the Switchgear Factory Berlin). Information additionally in clear text.	9

1) Only for class 0.2 and 0.5

Special versions

Options	
With routine test certificate in German/English	– Z A 1 0
Other special versions on request	

Configuration example

Indoor bushing-type current transformer, single-turn design
Maximum operating voltage U_m = 36 kV
Rated lightning impulse withstand voltage U_p = 170 kV
Rated short-duration power-frequency withstand voltage U_d = 70 kV
Rated short-time thermal current I_{th} = 50 kA
Rated primary current I_{PN} = 500 A
Thermal strength 100 x I_{PN}
1st core class 1; instrument security factor FS5; rating 30 VA
2nd core class 10P; accuracy limit factor 10; rating 30 VA
Rated secondary current 1st core 5 A; 2nd core 1 A
Power frequency 50 Hz; marking according to VDE

Example for Order No.: 4 M C 2 6 6 7 – 0 U H 4 0 – 4 Q F 0
Order codes:

4MC3 indoor bar-primary bushing-type current transformer

5th position
Operating voltage (maximum value)

Operating voltage U_m kV	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16	Order codes	
12	75	28	4 M C 3 2		See page 48
24	125	50	4 M C 3 4		See page 48
36	170	70	4 M C 3 6		See page 48

6th to 9th position
Rated short-time thermal current/ Rated primary current

Rated short-time thermal current I_{th} kA	Rated primary current I_{PN} A									
200	2000	8	2	–	1	F				See page 48
250	2500	8	4	–	1	G				See page 48
300	3000	8	5	–	1	H				See page 48
400	4000	8	7	–	1	J				See page 48
500	5000	8	8	–	1	K				See page 49
600	6000	7	0	–	1	L				See page 49
800	8000	7	2	–	1	N				See page 49
1000	10000	7	3	–	1	P				See page 49

Configuration example
Indoor bar-primary bushing-type current transformer
Maximum operating voltage U_m = 12 kV
Rated lightning impulse withstand voltage U_p = 75 kV
Rated short-duration power-frequency withstand voltage U_d = 28 kV
Rated short-time thermal current I_{th} = 400 kA
Rated primary current I_{PN} = 4000 A

Example for Order No.: 4 M C 3 2 8 7 – 1 J

Order codes:

10th to 14th position
Core versions

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes

Order No.: 4 M C 3 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★ ■ ■ ■

See page 49 (position 15) · See page 49 (position 16) · See page 49 (order codes)

At rated primary current I_{PN}	Thermal strength	Position 12
2000 A 2500 A 3000 A 4000 A 5000 A 6000 A 8000 A 10000 A	100 x I_{PN}	0

1st core Class	1st core Factor	1st core VA rating	2nd core Class	2nd core Factor	2nd core VA rating	3rd core Class	3rd core Factor	3rd core VA rating	4th core Class	4th core Factor	4th core VA rating	Rated primary current I_{PN} 2000–3000 A	4000–6000 A	8000–10000 A	Positions 10 11 12 – 13 14
0.2	FS10	15										■	■	■	C 3 – 0 A
		30										■	■	■	C 4 – 0 A
0.5	FS10	15										■	■	■	F 3 – 0 A
		30										■	■	■	F 4 – 0 A
1	FS10	30										■	■	■	J 4 – 0 A
		60										■	■	■	J 6 – 0 A
10P	10	30										■	■	■	Q 4 – 0 A
		60										■	■	■	Q 6 – 0 A
10P	20	60										■	■	■	S 6 – 0 A
		100										■	■	■	S 8 – 0 A
0.5	FS10	15	10P	10	30							■	■	■	F 3 – 4 Q
		15			60							■	■	■	F 3 – 6 Q
		15	10P	20	60							■	■	■	F 3 – 6 S
		30			60							■	■	■	F 4 – 6 S
1	FS10	60	10P	20	100							■	■	■	J 6 – 8 S
10P	10	60										■	■	■	Q 6 – 8 S
10P	20	60										■	■	■	S 6 – 8 S
		100										■	■	■	S 8 – 8 S
0.5	FS10	15	10P	10	30	10P	10	60				■	■	■	Y 0 – 0 A
1	FS10	30	10P	20	60	10P	20	100				■	■	■	Y 0 – 0 B
0.2	FS10	15	0.2	FS10	30	10P	10	30				■	■	■	Y 0 – 0 C
0.5	FS10	15			30			30				■	■	■	Y 0 – 0 D
0.2	FS10	30	1	FS10	60	10P	10	60	10P	20	100	■	■	■	Y 0 – 1 A
0.5	FS10	30			60			60			100	■	■	■	Y 0 – 1 B
1	FS10	30			60			60			100	■	■	■	Y 0 – 1 C
0.2	FS10	30	1	FS10	60	10P	10	60	10P	20	100	■	■	■	Y 0 – 1 D
0.5	FS10	30			60			60			100	■	■	■	Y 0 – 1 E
1	FS10	30			60			60			100	■	■	■	Y 0 – 1 F

■ Feasible (other combinations on request)

Configuration example
Indoor bar-primary bushing-type current transformer
(U_m = 12 kV, I_{th} = 400 kA, I_{PN} = 4000 A)
Thermal strength 100 x I_{PN}
1st core class 0.5; instrument security factor FS10; rating 15 VA
2nd core class 0.2; instrument security factor FS10; rating 30 VA
3rd core class 10P; accuracy limit factor 10; rating 30 VA

4 M C 3
2 8 7 – 1 J
0
Y 0 – 0 D

Example for Order No.: 4 M C 3 2 8 7 – 1 J Y 0 0 – 0 D ■ ■
Order codes:

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes
Order No.: 4 M C 3 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ = ★ ■ ■ ■

15th position
Rated secondary current

Rated current for 1st core	Rated current for 2nd core	Rated current for 3rd core	Rated current for 4th core	
1 A	Without	Without	Without	0 A A
5 A	Without	Without	Without	0 A B
1 A	1 A	Without	Without	C
5 A	5 A	Without	Without	D
1 A	5 A	Without	Without	E
5 A	1 A	Without	Without	F
1 A	1 A	1 A	Without	G
5 A	5 A	5 A	Without	H
1 A	1 A	1 A	1 A	J
5 A	5 A	5 A	5 A	K

16th position
Additional features

Options	
50 Hz, VDE marking	0
50 Hz, IEC marking	1
50 Hz, VDE marking with approval [1]	2
60 Hz, IEC marking	6
Further not listed special versions (only after consultation with the order processing department in the Switchgear Factory Berlin). Information additionally in clear text.	9

1) Only for class 0.2 and 0.5

Special versions

Options	
With routine test certificate in German/English	– Z A 1 0
Size (for specification see the following pages)	– Z A 1 1
	– Z A 1 2
	– Z A 2 1
	– Z A 2 2
	– Z A 3 1
	– Z A 3 2
	– Z A 4 1
	– Z A 4 2
	– Z A 5 1
	– Z A 5 2
	– Z A 6 1
	– Z A 6 2
	– Z A 7 2
	– Z A 7 3

Other special versions on request

Configuration example

Indoor bar-primary bushing-type current transformer
Maximum operating voltage U_m = 12 kV
Rated lightning impulse withstand voltage U_p = 75 kV
Rated short-duration power-frequency withstand voltage U_d = 28 kV
Rated short-time thermal current I_{th} = 400 kA
Rated primary current I_{PN} = 4000 A
Thermal strength 100 x I_{PN}
1st core class 0.5; instrument security factor FS10; rating 15 VA
2nd core class 0.2; instrument security factor FS10; rating 30 VA
3rd core class 10P; accuracy limit factor 10; rating 30 VA
Rated secondary current 1st core 1 A; 2nd core 1 A; 3rd core 1 A
Power frequency 50 Hz; marking according to IEC
Size 42

4 M C 3 2 8 7 – 1 J 0 D G 1 – Z A 4 2

Example for Order No.: 4 M C 3 2 8 7 – 1 J 0 D G 1 – Z A 4 2
Order codes: A A 2

Size specification for 4MC32 transformers [1]

10th to 14th position of Order No.	6th to 9th position of Order No.							
	82-1F	84-1G	85-1H	87-1J	88-1K	90-1L	92-1N	93-1P
C30-0A C40-0A F30-0A F40-0A J40-0A J60-0A Q40-0A Q60-0A S60-0A	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52, 61, 62	31, 32, 41, 42, 51, 52, 61, 62, 72, 73	41, 42, 51, 52, 61, 62, 72, 73
S80-0A	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	12, 21, 22, 31, 32, 41, 42, 51, 52	22, 31, 32, 41, 42, 51, 52, 61, 62, 72, 73	31, 32, 41, 42, 51, 52, 62, 72, 73	41, 42, 51, 52, 62, 72, 73
F30-4Q	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	22, 31, 32, 41, 42, 51, 52, 62, 72, 73	32, 42, 51, 52, 62, 72, 73	51, 52, 62, 72, 73
F30-6Q	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	12, 21, 22, 31, 32, 41, 42, 51, 52	22, 31, 32, 41, 42, 51, 52, 62, 72, 73	32, 42, 51, 52, 62, 72, 73	42, 51, 52, 62, 72, 73
F30-6S F40-6S	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	12, 21, 22, 31, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52, 61, 62	42, 51, 52, 62, 72, 73	42, 51, 52, 62, 72, 73
J60-8S	12, 21, 22, 31, 32	12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52, 61, 62	31, 32, 41, 42, 51, 52, 61, 62, 72, 73	42, 52, 62, 72, 73
Q60-8S	12, 21, 22, 31, 32	12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 32, 41, 42, 51, 52, 61, 62	32, 41, 42, 51, 52, 62, 72, 73	42, 52, 62, 72, 73
S60-8S	12, 21, 22, 31, 32	12, 21, 22, 31, 32	21, 22, 31, 32, 41, 42	12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 32, 41, 42, 52, 61, 62	32, 41, 42, 51, 52, 62, 72, 73	42, 52, 62, 72, 73
S80-8S	21, 22, 32	12, 21, 22, 32	21, 22, 31, 32, 41, 42	21, 22, 32, 41, 42, 51, 52	21, 22, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52, 62	41, 42, 51, 52, 62, 72, 73	42, 52, 62, 72, 73
Y00-0A	11, 12, 21, 22, 31, 32	11,12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	12, 21, 22, 31, 32, 41, 42, 51, 52	22, 31, 32, 41, 42, 51, 52	32, 42, 51, 52, 61, 62	52, 62, 72, 73	52, 62, 72, 73
Y00-0B	21, 22, 32	21, 22, 32	22, 32, 41, 42	22, 32, 42, 51, 52	22, 32, 42, 52	22, 42, 52, 62	42, 52, 62, 72, 73	52, 62, 72, 73
Y00-0C Y00-0D	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	12, 21, 22, 31, 32, 41, 42, 51, 52	12, 22, 32, 41, 42, 51, 52	22, 32, 42, 51, 52	52, 62, 72, 73	52, 62, 72, 73
Y00-1A Y00-1B Y00-1C	12, 22, 32	22, 32	22, 32, 42	22, 32, 42, 52	42, 52	52, 62	73	73
Y00-1D Y00-1E Y00-1F	22, 32	22, 32	22, 32, 42	41, 52	52	52, 62	73	73

1) Selection for transformers with rated secondary current 1 A. Sizes for 5 A on request

4MC3 indoor bar-primary bushing-type current transformer

Size specification for 4MC34 transformers [1]

10th to 14th position of Order No.	6th to 9th position of Order No.							
	82-1F	84-1G	85-1H	87-1J	88-1K	90-1L	92-1N	93-1P
C30-0A C40-0A F30-0A F40-0A J40-0A J60-0A Q40-0A Q60-0A S60-0A	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52, 61, 62	31, 32, 41, 42, 51, 52, 61, 62, 72, 73	41, 42, 51, 52, 61, 62, 72, 73
S80-0A	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 31, 32, 41, 42, 51, 52, 61, 62, 72, 73	31, 32, 41, 42, 51, 52, 62, 72, 73	41, 42, 51, 52, 62, 72, 73
F30-4Q	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 31, 32, 41, 42, 51, 52, 62, 72, 73	32, 42, 51, 52, 62, 72, 73	51, 52, 62, 72, 73
F30-6Q	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 31, 32, 41, 42, 51, 52, 62, 72, 73	32, 42, 51, 52, 62, 72, 73	42, 51, 52, 62, 72, 73
F30-6S F40-6S	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52, 61, 62	42, 51, 52, 62, 72, 73	42, 51, 52, 62, 72, 73
J60-8S	12, 21, 22, 31, 32	12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52, 61, 62	31, 32, 41, 42, 51, 52, 61, 62, 72, 73	42, 52, 62, 72, 73
Q60-8S	12, 21, 22, 31, 32	12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52, 61, 62	32, 41, 42, 51, 52, 62, 72, 73	42, 52, 62, 72, 73
S60-8S	21, 22, 31, 32	21, 22, 31, 32	21, 22, 31, 32, 41, 42	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 32, 41, 42, 52, 61, 62	42, 51, 52, 62, 72, 73	42, 52, 62, 72, 73
S80-8S	21, 22, 32	21, 22, 32	21, 22, 31, 32, 41, 42	21, 22, 32, 41, 42, 51, 52	21, 22, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52, 62	41, 42, 51, 52, 62, 72, 73	42, 52, 62, 72, 73
Y00-0A	11, 12, 21, 22, 31, 32	11,12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 32, 42, 51, 52, 61, 62	22, 32, 42, 51, 52, 61, 62, 72, 73	42, 52, 62, 72, 73
Y00-0B	22, 32	21, 22, 32	22, 32, 41, 42	22, 32, 42, 51, 52	22, 32, 42, 52	22, 42, 52, 62	42, 52, 62, 72, 73	52, 62, 72, 73
Y00-0C Y00-0D	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	12, 21, 22, 31, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52	22, 32, 42, 51, 52	52, 62, 72, 73	52, 62, 72, 73
Y00-1A Y00-1B Y00-1C	12, 22, 32	22, 32	22, 32, 42	22, 32, 42, 52	42, 52	52, 62	73	73
Y00-1D Y00-1E Y00-1F	22, 32	22, 32	22, 32, 42	41, 52	52	52, 62	73	73

1) Selection for transformers with rated secondary current 1 A. Sizes for 5 A on request

2

Size specification for 4MC36 transformers [1]

10th to 14th position of Order No.	6th to 9th position of Order No.							
	82-1F	84-1G	85-1H	87-1J	88-1K	90-1L	92-1N	93-1P
C30-0A C40-0A F30-0A F40-0A J40-0A J60-0A Q40-0A	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	11, 12, 21, 22, 31, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52, 61, 62	31, 32, 41, 42, 51, 52, 61, 62, 72, 73	41, 42, 51, 52, 61, 62, 72, 73
Q60-0A S60-0A	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42, 51, 52	11, 12, 21, 22, 31, 32, 41, 42	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52, 61, 62	31, 32, 41, 42, 51, 52, 61, 62, 72, 73	41, 42, 51, 52, 61, 62, 72, 73
S80-0A	12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32, 41, 42	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 31, 32, 41, 42, 51, 52, 61, 62	41, 42, 51, 52, 62, 72, 73	41, 42, 51, 52, 62, 72, 73
F30-4Q	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 31, 32, 41, 42, 51, 52, 62	42, 52, 62, 72, 73	52, 62, 72, 73
F30-6Q	12, 21, 22, 31, 32	12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 31, 32, 41, 42, 51, 52, 62	42, 52, 62, 72, 73	52, 62, 72, 73
F30-6S	12, 21, 22, 31, 32	12, 21, 22, 31, 32	12, 21, 22, 31, 32, 41, 42	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	22, 32, 42, 51, 52, 61, 62	42, 52, 62, 72, 73	52, 62, 72, 73
F40-6S	12, 21, 22, 31, 32	12, 21, 22, 31, 32	21, 22, 31, 32, 41, 42	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 32, 41, 42, 51, 52, 61, 62	41, 42, 51, 52, 62, 72, 73	42, 52, 62, 72, 73
J60-8S	12, 21, 22, 31, 32	12, 21, 22, 31, 32	21, 22, 31, 32, 41, 42	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52	21, 22, 31, 32, 41, 42, 51, 52, 61, 62	41, 42, 51, 52, 61, 62, 72, 73	42, 52, 62, 72, 73
Q60-8S	21, 22, 31, 32	12, 21, 22, 31, 32	21, 22, 32, 41, 42	21, 22, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52, 61, 62	42, 51, 52	42, 52, 62, 72, 73
S60-8S	21, 22, 32	21, 22, 32	21, 22, 32, 41, 42	21, 22, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52	22, 41, 42, 51, 52, 61, 62	42, 52, 62, 72, 73	52, 62, 72, 73
S80-8S	21, 22, 32	31, 32, 42	21, 22, 32, 41, 42	21, 22, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52, 62	42, 52, 62, 72, 73	52, 62, 72, 73
Y00-0A	11, 12, 21, 22, 31, 32	11,12, 21, 22, 31, 32	21, 22, 31, 32, 41, 42	21, 22, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52	22, 42, 52, 61, 62	52	52, 62, 72, 73
Y00-0B	22, 32	22, 32	22, 32	22, 42, 52	42, 52	42, 52, 62	52	73
Y00-0C Y00-0D	11, 12, 21, 22, 31, 32	11, 12, 21, 22, 31, 32	21, 22, 31, 32, 41, 42	21, 22, 32, 41, 42, 51, 52	22, 32, 41, 42, 51, 52	22, 52, 62	73	73
Y00-1A Y00-1B Y00-1C	22, 32	22, 32	22, 32	42, 52	52	–	73	73
Y00-1D Y00-1E Y00-1F	22	22	22, 42	52	–	–	73	73

1) Selection for transformers with rated secondary current 1 A. Sizes for 5 A on request

4ME2 outdoor support-type current transformer

5th position
Operating voltage (maximum value)

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes
Order No.: 4 M E 2 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ■ ■ ■

Operating voltage U_m kV	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV		
12	75	28	4 M E 2 2	See page 55
24	125	50	4 M E 2 4	See page 55
36	170	70	4 M E 2 6	See page 55

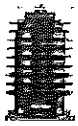
6th to 9th position
Rated short-time thermal current/
Rated primary current

Rated short-time thermal current I_{th} kA	Rated primary current I_{PN} A	Rated primary current, with primary multi-ratio I_{PN} A	Thermal strength 300 x I_{PN}	200 x I_{PN}	100 x I_{PN}		
0.5	2x	5	■		■	0 0 – 3 A	See page 55
0.6	2x	10	■		■	0 1 – 3 B	See page 55
1	2x	5		■		0 3 – 3 A	See page 55
1.5	2x	15	■		■	0 7 – 3 D	See page 55
2.5	2x	25	■		■	1 6 – 3 F	See page 55
3	2x	15		■		1 7 – 3 D	See page 55
5	2x	25		■		2 5 – 3 F	See page 55
5	2x	50	■		■	2 5 – 3 J	See page 55
7.5	2x	75	■	■	■	3 2 – 3 L	See page 55
10	2x	50		■		3 6 – 3 J	See page 55
10	2x	100	■		■	3 6 – 3 M	See page 55
15	2x	75		■		4 3 – 3 L	See page 55
15	2x	150	■		■	4 3 – 3 P	See page 55
20	2x	100		■		4 8 – 3 M	See page 55
20	2x	200	■		■	4 8 – 3 Q	See page 55
25	2x	250	■		■	5 4 – 3 R	See page 55
30	2x	150		■		5 6 – 3 P	See page 55
30	2x	300	■		■	5 6 – 3 S	See page 55
40	2x	200		■		6 3 – 3 Q	See page 55
40	2x	400	■		■	6 3 – 3 T	See page 55
50	2x	250		■		6 7 – 3 R	See page 55
50	2x	500	■		■	6 7 – 3 U	See page 55
60	2x	300		■		7 0 – 3 S	See page 55
60	2x	600	■		■	7 0 – 3 V	See page 55

6th to 9th position continued on page 54

Configuration example
Outdoor support-type current transformer
Maximum operating voltage U_m = 24 kV
Rated lightning impulse withstand voltage U_p = 125 kV
Rated short-duration power-frequency withstand voltage U_d = 50 kV
Rated short-time thermal current I_{th} = 15 kA
Rated primary current I_{PN} = 2x 75 A

Example for Order No.: 4 M E 2 4 4 3 5 0 ■ ■ ■ ■ ■ ■ ■
Order codes:



6th to 9th position (continued)
Rated short-time thermal current/ Rated primary current

Rated short-time thermal current I_{th} kA	Rated primary current I_{PN} A	Rated primary current, with primary multi-ratio I_{PN} A	Thermal strength 300 x I_{PN}	200 x I_{PN}	100 x I_{PN}	6th to 9th position	See page
0.5	5		■		■	0 0 – 0 A	55
0.6	10		■		■	0 1 – 0 B	55
1	5			■	■	0 3 – 0 A	55
1.5	15		■		■	0 7 – 0 D	55
2	10			■	■	1 3 – 0 B	55
2	20		■		■	1 3 – 0 E	55
3	15			■	■	1 7 – 0 D	55
3	30		■		■	1 7 – 0 G	55
4	20			■	■	2 2 – 0 E	55
4	40		■		■	2 2 – 0 H	55
5	50		■		■	2 5 – 0 J	55
6	30			■	■	2 6 – 0 G	55
6	60		■		■	2 6 – 0 K	55
7.5	75		■		■	3 2 – 0 L	55
8	40			■	■	3 3 – 0 H	55
10	50			■	■	3 6 – 0 J	55
10	100		■		■	3 6 – 0 M	55
12	60			■	■	3 8 – 0 K	55
15	75			■	■	4 3 – 0 L	55
15	150		■		■	4 3 – 0 P	55
20	100			■	■	4 8 – 0 M	55
20	200		■		■	4 8 – 0 Q	55
25	250		■		■	5 3 – 0 R	55
30	150			■	■	5 6 – 0 P	55
30	300		■		■	5 6 – 0 S	55
40	200			■	■	6 3 – 0 Q	55
40	400		■		■	6 3 – 0 T	55
50	250			■	■	6 7 – 0 R	55
50	500		■		■	6 7 – 0 U	55
60	300			■	■	7 0 – 0 S	55
60	600		■		■	7 0 – 0 V	55
80	400			■	■	7 3 – 0 T	55
80	800		■		■	7 3 – 0 X	55
100	500			■	■	7 5 – 0 U	55
100	1000		■		■	7 5 – 1 A	56
120	600			■	■	7 6 – 0 V	56
120	1200		■		■	7 6 – 1 B	56

Configuration example
Outdoor support-type current transformer
(U_m = 24 kV, U_p = 125 kV, U_d = 50 kV)
Rated short-time thermal current I_{th} = 100 kA
Rated primary current I_{PN} = 1000 A

Example for Order No.: 4 M E 2 4 7 5 – 1 A
Order codes:

10th to 14th position
Core versions

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes
Order No.: 4 M E 2 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ – ★ ■ ■ ■

See page 56 See page 56 See page 56

At rated primary current I_{PN}	Thermal strength	
0.5 0.6 1.5 2 2.5 3 4 5 6 7.5 10 15 20 25 30 40 50 60 80 100 120	100 x I_{PN}	0
1 2 3 4 5 6 8 10 12 15 20 30 40 50 60 80 100 120	200 x I_{PN}	2
0.5 0.6 1.5 2 2.5 3 4 5 6 7.5 10 15 20 25 30 40 50 60 80 100 120	300 x I_{PN}	3

1st core			2nd core			3rd core			Rated primary current I_{PN}			
Class	Factor	VA rating	Class	Factor	VA rating	Class	Factor	VA rating	300 x I_{PN}	200 x I_{PN}	100 x I_{PN}	
0.2	FS10	5							■	■	■	C 1 – 0 A
		10							■	■	■	C 2 – 0 A
		15							■	■	■	C 3 – 0 A
		30							■	■	■	C 4 – 0 A
0.5	FS5	10							■	■	■	E 2 – 0 A
		15							■	■	■	E 3 – 0 A
		30							■	■	■	E 4 – 0 A
1	FS5	15							■	■	■	H 3 – 0 A
		30							■	■	■	H 4 – 0 A
5P	10	15							■	■	■	L 3 – 0 A
		30							■	■	■	L 4 – 0 A
		60							■	■	■	L 6 – 0 A
10P	10	15							■	■	■	Q 3 – 0 A
		30							■	■	■	Q 4 – 0 A
		60							■	■	■	Q 6 – 0 A
0.2	FS10	10	5P	10	30				■	■	■	C 2 – 4 L
		15			30				■	■	■	C 3 – 4 L
		30			60				■	■	■	C 4 – 6 L
0.5	FS5	10	5P	10	30				■	■	■	E 2 – 4 L
		15			30				■	■	■	E 3 – 4 L
		30			30				■	■	■	E 4 – 4 L
		30			60				■	■	■	E 4 – 6 L
1	FS5	15	5P	10	30				■	■	■	H 3 – 4 L
		30			30				■	■	■	H 4 – 4 L
		30			60				■	■	■	H 4 – 6 L
1	FS5	15	10P	10	30				■	■	■	H 3 – 4 Q
		30			30				■	■	■	H 4 – 4 Q
		30			60				■	■	■	H 4 – 6 Q
0.2	FS10	15	0.5	FS5	15	5P	10	15	■	■	■	Y 0 – 0 E
		15			30			30	■	■	■	Y 0 – 0 F
0.5	FS5	15	5P	10	15	5P	10	15	■	■	■	Y 0 – 0 G
		15			30			30	■	■	■	Y 0 – 0 H

■ Feasible (other combinations on request)

Configuration example
Outdoor support-type current transformer
(U_m = 24 kV, I_{th} = 100 kA, I_{PN} = 1000 A)
Thermal strength 300 x I_{PN}
1st core class 10P; instrument security factor 10; rating 60 VA
2nd core without
3rd core without

4 M E 2 4 7 5 – 1 A 3 ■ ■ – 0 A

Example for Order No.: 4 M E 2 4 7 5 – 1 A Q 6 3 2 0 A ★ ■ ■ ■
Order codes:

15th position
Rated secondary current

Rated current for 1st core	Rated current for 2nd core	Rated current for 3rd core
1 A	Without	Without
5 A	Without	Without
1 A	1 A	Without
5 A	5 A	Without
1 A	5 A	Without
5 A	1 A	Without
1 A	1 A	1 A
5 A	5 A	5 A

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes
Order No.: 4 M E 2 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ■ ■ ■

0 A A
0 A B
C
D
E
F
G
H
0
1
2
6
9

16th position
Additional features

Options	
50 Hz, VDE marking	– Z A 1 0
50 Hz, IEC marking	– Z A 0 0
50 Hz, VDE marking with approval 1)	– Z A 0 1
60 Hz, IEC marking	– Z A 0 2
Further not listed special versions (only after consultation with the order processing department in the Switchgear Factory Berlin), Information additionally in clear text.	– Z A 0 3

1) Only for class 0.2 and 0.5

Special versions

Options	
With routine test certificate in German/English	
Size (for specification see the following page)	0
	1
	2
	3
Other special versions on request	

Configuration example

Outdoor support-type current transformer 4 M E 2
Maximum operating voltage U_m = 24 kV 4
Rated lightning impulse withstand voltage U_p = 125 kV 7 5
Rated short-duration power-frequency withstand voltage U_d = 50 kV – 1 A
Rated short-time thermal current I_{th} = 100 kA 3
Rated primary current I_{PN} = 1000 A Q 6
Thermal strength 300 x I_{PN} – 0 A
1st core class 10P; instrument security factor 10; rating 60 VA B 1
2nd core without – Z A 0 1
3rd core without
Rated secondary current 1st core 5 A; 2nd core without; 3rd core without
Power frequency 50 Hz; marking according to IEC
Size 1

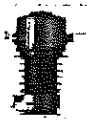
Example for Order No.: 4 M E 2 4 7 5 – 1 A Q 6 3 – 0 A B 1 – Z A 0 1
Order codes: A 0 1

4ME2 outdoor support-type current transformer

Size specification for 4ME2 transformers

Order No.	Up to 12 kV			At 24 kV		At 36 kV
	with rated short-time thermal current					
	$100 \times I_{PN}$	$200 \times I_{PN}$	$300 \times I_{PN}$	$100 \times I_{PN}$	$200 \times I_{PN}$	$100 \times I_{PN}$
...C1.-0A...	1	1	1	1	1	1
...C2.-0A...	1	1	1	1	1	1
...C3.-0A...	1	1	1	1	1	1
...C4.-0A...	1	1	1	1	1	1
...E2.-0A...	1	1	1	1	1	1
...E3.-0A...	1	1	1	1	1	1
...E4.-0A...	1	1	1	1	1	1
...H3.-0A...	1	1	1	1	1	1
...H4.-0A...	1	1	1	1	1	1
...L3.-0A...	1	1	1	1	1	1
...L4.-0A...	1	1	2	1	1	1
...L6.-0A...	2	2	2	1	2	1
...Q3.-0A...	1	1	1	1	1	1
...Q4.-0A...	1	1	2	1	1	1
...Q6.-0A...	2	2	2	1	2	2
...C2.-4L...	1	2	2	1	2	2
...C3.-4L...	1	1	2	1	2	2
...C4.-6L...	2	2	2	2	2	2
...E2.-4L...	1	1	2	1	2	2
...E3.-4L...	1	1	2	2	2	1
...E4.-4L...	1	2	2	2	2	1
...E4.-6L...	2	2	2	2	2	2
...H3.-4L...	1	2	2	1	2	2
...H4.-4L...	1	2	2	1	2	2
...H4.-6L...	2	2	2	2	2	2
...H3.-4Q...	1	2	2	1	2	2
...H4.-4Q...	1	2	2	1	2	2
...H4.-6Q...	2	2	2	2	2	2
...Y0.-0E...	2	2	2	1	2	2
...Y0.-0F...	2	2	2	2	2	2
...Y0.-0G...	2	2	2	2	2	2
...Y0.-0H...	2	2	2	2	2	2

2



4ME3 outdoor support-type current transformer

5th position
Operating voltage (maximum value)

Operating voltage U_m kV	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16	Order codes	
			Order No.: 4 M E 3 ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	★	
12	75	28	4 M E 3 2		See page 60
24	125	50	4 M E 3 4		See page 60
36	170	70	4 M E 3 6		See page 60
52	250	95	4 M E 3 8		See page 61
					See page 61
					See page 61
					See page 61

6th to 9th position
Rated short-time thermal current/ Rated primary current

Rated short-time thermal current I_{th} kA	Rated primary current I_{PN} A	Rated primary current, with primary multiratio I_{PN} A	Thermal strength 300 x I_{PN}	200 x I_{PN}	100 x I_{PN}	6 7 8 9
0.5	2x	5	■		■	0 0 – 3 A
0.6	2x	10	■		■	0 1 – 3 B
1	2x	5		■		0 3 – 3 A
1.5	2x	15	■		■	0 7 – 3 D
2.5	2x	25	■		■	1 6 – 3 F
3	2x	15		■		1 7 – 3 D
5	2x	25		■		2 5 – 3 F
5	2x	50	■		■	2 5 – 3 J
7.5	2x	75	■	■	■	3 2 – 3 L
10	2x	50		■		3 6 – 3 J
10	2x	100	■		■	3 6 – 3 M
15	2x	75		■		4 3 – 3 L
15	2x	150	■		■	4 3 – 3 P
20	2x	100		■		4 8 – 3 M
20	2x	200	■		■	4 8 – 3 Q
25	2x	250	■		■	5 4 – 3 R
30	2x	150		■		5 6 – 3 P
30	2x	300	■		■	5 6 – 3 S
40	2x	200		■		6 3 – 3 Q
40	2x	400	■		■	6 3 – 3 T
50	2x	250		■		6 7 – 3 R
50	2x	500	■		■	6 7 – 3 U
60	2x	300		■		7 0 – 3 S
60	2x	600	■		■	7 0 – 3 V

6th to 9th position continued on page 59

Configuration example
Outdoor support-type current transformer
Maximum operating voltage U_m = 52 kV
Rated lightning impulse withstand voltage U_p = 250 kV
Rated short-duration power-frequency withstand voltage U_d = 95 kV
Rated short-time thermal current I_{th} = 25 kA
Rated primary current I_{PN} = 2x 250 A

Example for Order No.: 4 M E 3 8 5 4 – 3 R
Order codes:

6th to 9th position (continued)
Rated short-time thermal current/
Rated primary current

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 | Order codes
Order No.: 4 M E 3 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ★ ■ ■ ■

See page 60 · See page 60 · See page 60 · See page 60 · See page 60 · See page 61 · See page 61 · See page 61

Rated short-time thermal current I_{th} kA	Rated primary current I_{PN} A	Rated primary current, with primary multiratio I_{PN} A	Thermal strength 300 x I_{PN}	200 x I_{PN}	100 x I_{PN}	Positions 6 7 – 8 9
0.5	5		■		■	0 0 – 0 A
0.6	10		■		■	0 1 – 0 B
1	5			■		0 3 – 0 A
1.5	15		■		■	0 7 – 0 D
2	10			■		1 3 – 0 B
2	20		■		■	1 3 – 0 E
3	15			■		1 7 – 0 D
3	30		■		■	1 7 – 0 G
4	20			■		2 2 – 0 E
4	40		■		■	2 2 – 0 H
5	50		■		■	2 5 – 0 J
6	30			■		2 6 – 0 G
6	60		■		■	2 6 – 0 K
7.5	75		■		■	3 2 – 0 L
8	40			■		3 3 – 0 H
10	50			■		3 6 – 0 J
10	100		■		■	3 6 – 0 M
12	60			■		3 8 – 0 K
15	75			■		4 3 – 0 L
15	150		■		■	4 3 – 0 P
20	100			■		4 8 – 0 M
20	200		■		■	4 8 – 0 Q
25	250		■		■	5 3 – 0 R
30	150			■		5 6 – 0 P
30	300		■		■	5 6 – 0 S
40	200			■		6 3 – 0 Q
40	400		■		■	6 3 – 0 T
50	250			■		6 7 – 0 R
50	500		■		■	6 7 – 0 U
60	300			■		7 0 – 0 S
60	600		■		■	7 0 – 0 V
80	400			■		7 3 – 0 T
80	800		■		■	7 3 – 0 X
100	500			■		7 5 – 0 U
100	1000		■		■	7 5 – 1 A
120	600			■		7 6 – 0 V
120	1200		■		■	7 6 – 1 B
150	1500				■	7 8 – 1 D
200	2000				■	8 2 – 1 F
250	2500				■	8 4 – 1 G
300	3000				■	8 5 – 1 H

Configuration example
Outdoor support-type current transformer
(U_m = 52 kV, U_p = 250 kV, U_d = 95 kV)
Rated short-time thermal current I_{th} = 100 kA
Rated primary current I_{PN} = 1000 A

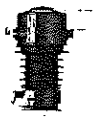
4 M E 3
8
7 5 – 1 A

Example for Order No.: 4 M E 3 8 7 5 – 1 A ■ ■ – ■ ■ ■ ■ – ■ ■ ■
Order codes:

ВЯРНО С ОРИГИНАЛА

МИГ 23 ЕООД СОФИЯ MIG 23 LTD

2



10th to 14th position
Core versions

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 Order codes
Order No.: 4 M E 3 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■

At rated primary current I_{PN}	Thermal strength	10th position	See page 61
0.5 0.6 1.5 2 2.5 3 4 5 6 7.5 10 15 20 25 30 40 50 60 80 100 120 150 200 250 300	100 x I_{PN}	0	
1 2 3 4 5 6 8 10 12 15 20 30 40 50 60 80 100 120	200 x I_{PN}	2	
0.5 0.6 1.5 2 2.5 3 4 5 6 7.5 10 15 20 25 30 40 50 60 80 100 120	300 x I_{PN}	3	

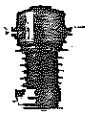
1st core Class	1st core Factor	1st core VA rating	2nd core Class	2nd core Factor	2nd core VA rating	3rd core Class	3rd core Factor	3rd core VA rating	Rated primary current I_{PN} 300 x I_{PN}	200 x I_{PN}	100 x I_{PN}	11th position	12th position	13th position	14th position	15th position	16th position
0.2	FS10	5							■	■	■	C	1	–	0	A	
		10							■	■	■	C	2	–	0	A	
		15							■	■	■	C	3	–	0	A	
		30							■	■	■	C	4	–	0	A	
0.5	FS5	10							■	■	■	E	2	–	0	A	
		15							■	■	■	E	3	–	0	A	
		30							■	■	■	E	4	–	0	A	
1	FS5	15							■	■	■	H	3	–	0	A	
		30							■	■	■	H	4	–	0	A	
5P	10	15							■	■	■	L	3	–	0	A	
		30							■	■	■	L	4	–	0	A	
		60							■	■	■	L	6	–	0	A	
10P	10	15							■	■	■	Q	3	–	0	A	
		30							■	■	■	Q	4	–	0	A	
		60							■	■	■	Q	6	–	0	A	
0.2	FS10	10	5P	10	30				■	■	■	C	2	–	4	L	
		15			30				■	■	■	C	3	–	4	L	
		30			60				■	■	■	C	4	–	6	L	
0.5	FS5	10	5P	10	30				■	■	■	E	2	–	4	L	
		15			30				■	■	■	E	3	–	4	L	
		30			30				■	■	■	E	4	–	4	L	
		30			60				■	■	■	E	4	–	6	L	
1	FS5	15	5P	10	30				■	■	■	H	3	–	4	L	
		30			30				■	■	■	H	4	–	4	L	
		30			60				■	■	■	H	4	–	6	L	
1	FS5	15	10P	10	30				■	■	■	H	3	–	4	Q	
		30			30				■	■	■	H	4	–	4	Q	
		30			60				■	■	■	H	4	–	6	Q	
0.2	FS10	15	0.5	FS5	15	5P	10	15	■	■	■	Y	0	–	0	E	
		15			30			30	■	■	■	Y	0	–	0	F	
0.5	FS5	15	5P	10	15	5P	10	15	■	■	■	Y	0	–	0	G	
		15			30			30	■	■	■	Y	0	–	0	H	

■ Feasible (other combinations on request)

Configuration example
Outdoor support-type current transformer
(U_m = 52 kV, I_{th} = 100 kA, I_{PN} = 1000 A)
Thermal strength 300 x I_{PN}
1st core class 10P; instrument security factor 10; rating 60 VA
2nd core without
3rd core without

4 M E 3 8 7 5 – 1 A 3 Q 6 – 0 A

Example for Order No.: 4 M E 3 8 7 5 – 1 A Q 6 3 – 0 A ■ ■
Order codes:



15th position
Rated secondary current

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16 — Order codes
Order No.: 4 M E 3 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ★ ■ ■ ■

Rated current for 1st core	Rated current for 2nd core	Rated current for 3rd core		
1 A	Without	Without	0 A	A
5 A	Without	Without	0 A	B
1 A	1 A	Without		C
5 A	5 A	Without		D
1 A	5 A	Without		E
5 A	1 A	Without		F
1 A	1 A	1 A		G
5 A	5 A	5 A		H

16th position
Additional features

Options	
50 Hz, VDE marking	0
50 Hz, IEC marking	1
50 Hz, VDE marking with approval 1)	2
60 Hz, IEC marking	6
Further not listed special versions (only after consultation with the order processing department in the Switchgear Factory Berlin). Information additionally in clear text.	9

1) Only for class 0.2 and 0.5

Special versions

Optionen	
With routine test certificate in German/English	– Z A 1 0
Other special versions on request	

Configuration example

Outdoor support-type current transformer — 4 M E 3
Maximum operating voltage U_m = 52 kV — 8
Rated lightning impulse withstand voltage U_p = 250 kV
Rated short-duration power-frequency withstand voltage U_d = 95 kV — 7 5 – 1 A
Rated short-time thermal current I_{th} = 100 kA
Rated primary current I_{PN} = 1000 A — 3
Thermal strength 300 x I_{PN}
1st core class 10P; instrument security factor 10; rating 60 VA
2nd core without — Q 6 – 0 A
3rd core without — B 1
Rated secondary current 1st core 5 A; 2nd core without; 3rd core without
Power frequency 50 Hz; marking according to IEC

Example for Order No.: 4 M E 3 8 7 5 – 1 A Q 6 – 0 A B 1
Order codes:

Voltage transformers, type of construction according to IEC [1]

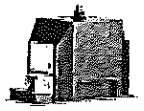
Illustration	Type of design	Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16	Order codes
		Order No.: 4 M ■ ■ ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■ – ■	


R-HG24-058.eps

Indoor voltage transformer, block-type design, small type of construction according to DIN 42600, single-phase cast-resin insulated, operating voltage up to 12 kV or 24 kV — 4 M R 1 — Selection from page **63ff**


R-HG24-059.eps

Indoor voltage transformer, block-type design, small type of construction according to DIN 42600, double-phase cast-resin insulated, operating voltage up to 12 kV or 24 kV — 4 M R 2 — Selection from page **63ff**


R-HG24-063.eps

Indoor voltage transformer, block-type design, large type of construction according to DIN 42600, single-phase cast-resin insulated, operating voltage up to 12 kV, 24 kV or 36 kV — 4 M R 5 — Selection from page **63ff**


R-HG24-064.eps

Indoor voltage transformer, block-type design, large type of construction according to DIN 42600, double-phase cast-resin insulated, operating voltage up to 12 kV, 24 kV or 36 kV — 4 M R 6 — Selection from page **63ff**


R-HG24-065.eps

Outdoor voltage transformer, small type of construction, single-phase cast-resin insulated, operating voltage up to 12 kV, 24 kV, 36 kV or 52 kV — 4 M S 3 — Selection from page **63ff**


R-HG24-055.eps

Outdoor voltage transformer, small type of construction, double-phase cast-resin insulated, operating voltage up to 12 kV, 24 kV, 36 kV or 52 kV — 4 M S 4 — Selection from page **63ff**


R-HG24-066.eps

Outdoor voltage transformer, large type of construction, single-phase cast-resin insulated, operating voltage up to 12 kV, 24 kV or 36 kV — 4 M S 5 — Selection from page **63ff**

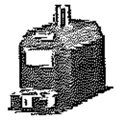

R-HG24-067.eps

Outdoor voltage transformer, large type of construction, double-phase cast-resin insulated, operating voltage up to 12 kV, 24 kV or 36 kV — 4 M S 6 — Selection from page **63ff**

1) Transformers according to ANSI standard on request

Example for Order No.: 4 M S 3 ■ ■ ■ – ■ ■ ■ ■ ■ – ■ ■ ■ ■

Order codes:



Maximum operating voltage U_{max} = 52 kV
12 kV

50/60 Hz

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 Order codes

Order No.: 4 M ■ ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ★ ■ ■ ■

Position 8: See page 65; Position 9: See page 65; Position 10: See page 66; Position 11: See page 66; Position 12: See page 67; ★: See page 67

Maximum operating voltage U_{max} kV	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Rated primary voltage U_{prim} kV	Type 4MR1 – single-phase	Type 4MR2 – double-phase	Type 4MR5 – single-phase	Type 4MR6 – double-phase	Type 4MS3 – single-phase	Type 4MS4 – double-phase	Type 4MS5 – single-phase	Type 4MS6 – double-phase	Pos. 5	Pos. 6	Pos. 7
12	75	28	3.3/√3	■		■						2	0	8
			3.3		■		■					2	0	8
			3.6/√3	■		■						2	7	0
			3.6		■		■					2	7	0
			4.8/√3	■		■						2	7	1
			4.8		■		■					2	7	1
			5 /√3	■		■		■		■		2	1	3
			5		■		■		■		■	2	1	3
			6 /√3	■		■		■		■		2	1	5
			6		■		■		■		■	2	1	5
			6.6/√3	■		■		■		■		2	1	7
			6.6		■		■		■		■	2	1	7
			7.2/√3	■		■						2	2	2
			7.2		■		■					2	2	2
			10 /√3	■		■		■		■		2	2	7
			10		■		■		■		■	2	2	7
			11 /√3	■		■		■		■		2	3	0
			11		■		■		■		■	2	3	0
			6–10 /√3			■						2	6	1
			6–10				■					2	6	1
			Others	■	■	■	■					2	9	9

2

Configuration example
Voltage transformer 4 M
Outdoor design, single-phase S 3
Rated primary voltage U_{prim} = 6.6/√3 kV 2 1 7

Example for Order No.: 4 M S 3 2 1 7 – ■ ■ ■ ■ ■
Order codes:

ВЯРНО С ОРИГИНАЛА

24 kV

50/60 Hz

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 Order codes

Order No.: 4 M ■ ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ★ ■ ■ ■

See page 65 (position 8), See page 65 (position 9), See page 66 (position 10), See page 66 (position 11), See page 67 (position 12), See page 67 (order codes)

Maximum operating voltage U_{max} kV	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Rated primary voltage U_{prim} kV	Type 4MR1 – single-phase	Type 4MR2 – double-phase	Type 4MR5 – single-phase	Type 4MR6 – double-phase	Type 4MS3 – single-phase	Type 4MS4 – double-phase	Type 4MS5 – single-phase	Type 4MS6 – double-phase	Position 5 6 7
24	125	50	13.8/√3	■		■		■		■		4 3 5
			13.8		■		■		■		■	4 3 5
			15 /√3	■		■		■		■		4 3 8
			15		■		■		■		■	4 3 8
			17.5/√3	■		■		■		■		4 7 2
			17.5		■		■		■		■	4 7 2
			20 /√3	■		■		■		■		4 4 2
			20		■		■		■		■	4 4 2
			22 /√3	■		■		■		■		4 4 3
			22		■		■		■		■	4 4 3
			10–20 /√3	■		■		■		■		4 6 5
			10–20		■		■		■		■	4 6 5
			15–20 /√3	■		■						4 6 2
			15–20		■		■					4 6 2
			Others	■	■	■	■					4 9 9

36 kV

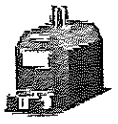
50/60 Hz

U_{max} kV	U_p kV	U_d kV	U_{prim} kV	4MR1	4MR2	4MR5	4MR6	4MS3	4MS4	4MS5	4MS6	Position 5 6 7
36	170	70	20 /√3			■						6 4 2
			20				■					6 4 2
			22 /√3			■						6 4 3
			22				■					6 4 3
			25 /√3			■		■		■		6 4 5
			25				■		■		■	6 4 5
			30 /√3			■		■		■		6 4 6
			30				■		■		■	6 4 6
			33 /√3			■		■		■		6 4 7
			33				■		■		■	6 4 7
			35 /√3			■		■		■		6 4 8
			35				■		■		■	6 4 8
			20–30 /√3			■						6 6 4
			20–30				■					6 6 4
			Others			■	■					6 9 9

Configuration example
Voltage transformer
Outdoor design, single-phase
Rated primary voltage U_{prim} = 20/√3 kV

4 M
S 3
4 4 2

Example for Order No.: 4 M S 3 4 4 2 – ■ ■ ■ ■ ■
Order codes:



52 kV

50/60 Hz

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 Order codes

Order No.: 4 M ■ ■ ■ ■ ■ ■ – ■ ■ ■ ■ ■ ★ ■ ■ ■

Maximum operating voltage U_{max} kV	Rated lightning impulse withstand voltage U_p kV	Rated short-duration power-frequency withstand voltage U_d kV	Rated primary voltage U_{prim} kV	Type 4MR1 – single-phase	Type 4MR2 – double-phase	Type 4MR5 – single-phase	Type 4MR6 – double-phase	Type 4MS3 – single-phase	Type 4MS4 – double-phase	Type 4MS5 – single-phase	Type 4MS6 – double-phase
52	250	95	$33/\sqrt{3}$					■			
			$35/\sqrt{3}$					■			
			$40/\sqrt{3}$					■			
			$45/\sqrt{3}$					■			

See page 66 See page 66 See page 67 See page 67

8 4 7
B 4 B

8 5 0
8 5 1

0
1
2
3

A
A
B
B
C
C

8th position
Auxiliary residual voltage winding

Voltage V	4MR1	4MR2	4MR5	4MR6	4MS3	4MS4	4MS5	4MS6
Without auxiliary winding	■	■	■	■	■	■	■	■
100/3	■		■		■		■	
110/3	■		■		■		■	
120/3	■		■		■		■	

9th position
Rated secondary voltage

Voltage V	4MR1	4MR2	4MR5	4MR6	4MS3	4MS4	4MS5	4MS6
$100/\sqrt{3}$	■		■		■		■	
100		■		■		■		■
$110/\sqrt{3}$	■		■		■		■	
110		■		■		■		■
$120/\sqrt{3}$	■		■		■		■	
120		■		■		■		■

Configuration example
Voltage transformer
Outdoor design, single-phase
Rated primary voltage with multi-ratio $U_{prim} = 35/\sqrt{3}$ kV
Without auxiliary residual voltage winding
Rated secondary voltage $U_{sec} = 110$ V

4 M
S 3
8 4 B –
0

Example for Order No.: 4 M S 3 B 4 B – 0 B ■ ■ ■

Order codes:

10th/11th position
Rated output of measuring winding and accuracy class

Voltage level U_{max} kV	Class %	Rated output S_r VA	Type 4MR1 – single-phase	Type 4MR2 – double-phase	Type 4MR5 – single-phase	Type 4MR6 – double-phase	Type 4MS3 – single-phase	Type 4MS4 – double-phase	Type 4MS5 – single-phase	Type 4MS6 – double-phase	Position: 10 11 Order No.:	Order codes
12	0.2	20	■	■							E 1	
	0.2	30			■	■	■	■	■	■	G 1	
	0.5	50	■	■							K 2	
	0.5	90						■		■	N 2	
	0.5	100			■	■	■		■		P 2	
	1	100	■	■							P 3	
	1	180						■		■	S 3	
	1	200			■	■	■		■		T 3	
24	0.2	20	■	■							E 1	
	0.2	25						■		■	F 1	
	0.2	30					■		■		G 1	
	0.2	45			■	■					J 1	
	0.5	50	■	■							K 2	
	0.5	75						■		■	M 2	
	0.5	100			■	■	■		■		P 2	
	1	100	■	■							P 3	
	1	150						■		■	R 3	
	1	200			■	■	■		■		T 3	
36	0.2	25					■		■		F 1	
	0.2	50			■	■					K 1	
	0.2	60						■		■	L 1	
	0.5	75					■		■		M 2	
	0.5	100			■	■					P 2	
	0.5	150						■		■	R 2	
	1	150					■		■		R 3	
	1	200			■	■					T 3	
	1	400						■		■	V 3	
52	0.2	60					■		■		L 1	
	0.5	180					■		■		S 2	
	1	400					■		■		V 3	

See page 67

See page 67

2

Configuration example
Voltage transformer
Outdoor design, single-phase
Rated output of measuring winding **180 VA**
Accuracy class **0.5**

Example for Order No.: 4 M S 3 8 4 8 – 0 B S 2
Order codes:

12th position
Additional features

Position: 1 2 3 4 5 6 7 – 8 9 10 11 12 – ★ Order codes
Order No.: 4 M ■ ■ ■ ■ ■ ■ – ■ ■ ■ ■ ■ – ★ ■ ■ ■

Options	4MR1	4MR2	4MR5	4MR6	4MS3	4MS4	4MS5	4MS6	
50 Hz, VDE marking	■	■	■	■	■	■	■	■	0
50 Hz, IEC marking	■	■	■	■	■	■	■	■	1
50 Hz, VDE marking with approval 1)	■	■	■	■	■	■	■	■	2
60 Hz, IEC marking	■	■	■	■	■	■	■	■	6
Other features on request	■	■	■	■	■	■	■	■	9

1) Only for class 0.2 and 0.5

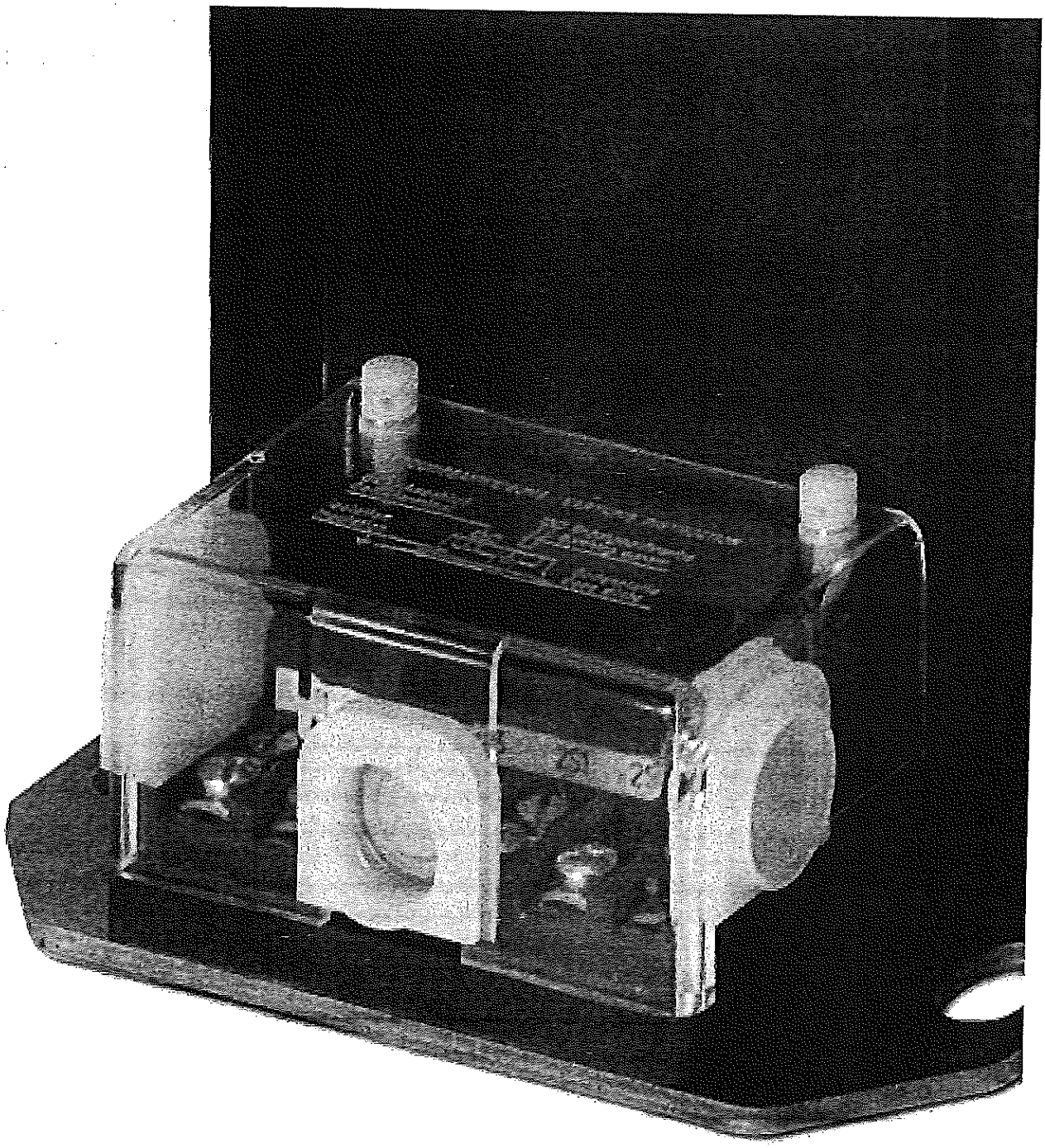
Additional equipment

Options	Type 4MR1 – single-phase	Type 4MR2 – double-phase	Type 4MR5 – single-phase	Type 4MR6 – double-phase	Type 4MS3 – single-phase	Type 4MS4 – double-phase	Type 4MS5 – single-phase	Type 4MS6 – double-phase	
With routine test certificate in German/English	■	■	■	■	■	■	■	■	– Z A 1 0

2

Configuration example
Voltage transformer
Outdoor design, single-phase, cast-resin insulated
Rated primary voltage with multi-ratio $U_{prim} = 35/\sqrt{3}$ kV
Without auxiliary residual voltage winding
Rated secondary voltage $U_{sec} = 110$ V
Rated output of measuring winding 180 VA
Accuracy class 0.5
Additional features 50 Hz, IEC marking
With routine test certificate in German/English

Example for Order No.: 4 M S 3 8 4 8 – 0 B S 2 1
Order codes: – Z A 1 0



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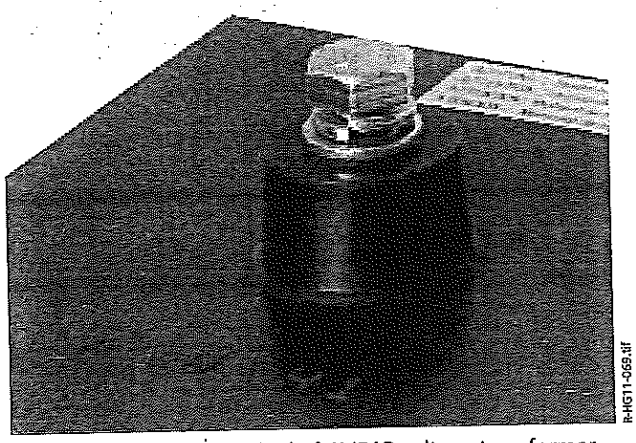


Primary connection terminal of 4MR12 voltage transformer

3

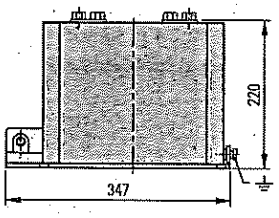
Order No.	Operating voltage (maximum value) U_m	Rated short-duration power-frequency withstand voltage U_d	Rated lightning impulse withstand voltage U_p	Rated frequency	Rated primary current I_{PN}	Multi-ratio	Secondary current I_{SN}	Maximum rated continuous thermal current	Rated short-time thermal current (minimum 100 x I_{PN}) I_{th}	Rated dynamic current (I_{dyn} 2.5 x I_{th}) I_{dyn}	Number of cores	Short-time load (mechanical)	Weight	Catalog dimension drawing
	kV	kV	kV	Hz	A		kA	x I_{PN}	kA	kA	maximum	N	kg	
4MA72	12	28	75	50/60	20 to 2500	2 x 20 to 2 x 600	1/5	1.2	80	120	–	5000	20	1
4MA72...Z F18	17.5	38	95	50/60	20 to 2500	2 x 20 to 2 x 600	1/5	1.2	80	120	–	5000	20	1
4MA74	24	50	125	50/60	20 to 2500	2 x 20 to 2 x 600	1/5	1.2	80	120	–	5000	25	2
4MA76	36	70	170	50/60	20 to 2000	2 x 20 to 2 x 600	1/5	1.2	80	120	–	5000	35	3
4MB12	12	28	75	50/60	1500 to 4000	only possible on secondary side	1/5	1.2	100 x I_{PN}	practically unlimited	3	3000	19 or 26	4
4MB13	12	28	75	50/60	1500 to 6000	only possible on secondary side	1/5	1.2	100 x I_{PN}	practically unlimited	3	3000	34	4
4MB14	24[1]	50[1]	125[1]	50/60	1500 to 4000	only possible on secondary side	1/5	1.2	100 x I_{PN}	practically unlimited	3	3000	26	4
4MC22	12	28	75	50/60	150 to 3000	only possible on secondary side	1/5	1.2	100 x I_{PN}	practically unlimited	3	5000	12 to 48	5
4MC24	24	50	125	50/60	150 to 3000	only possible on secondary side	1/5	1.2	100 x I_{PN}	practically unlimited	3	5000	28 to 48	5
4MC26	36	70	170	50/60	150 to 3000	only possible on secondary side	1/5	1.2	100 x I_{PN}	practically unlimited	3	5000	35 to 48	5
4MC32	12	28	75	50/60	2000 to 10000	only possible on secondary side	1/5	1.2	100 x I_{PN}	practically unlimited	4	5000	32 to 150	6
4MC34	24	50	125	50/60	2000 to 10000	only possible on secondary side	1/5	1.2	100 x I_{PN}	practically unlimited	4	5000	32 to 150	7
4MC36	36	70	170	50/60	2000 to 10000	only possible on secondary side	1/5	1.2	100 x I_{PN}	practically unlimited	4	5000	32 to 150	8
4ME22	12	28	75	50/60	5 to 1200	2 x 5 to 2 x 600	1/5	1.2	80	2.5 x I_{th}	3	2400	22	9/10
4ME24	24	50	125	50/60	5 to 1200	2 x 5 to 2 x 600	1/5	1.2	80	2.5 x I_{th}	3	2400	22	9/10
4ME26	36	70	170	50/60	5 to 1200	2 x 5 to 2 x 600	1/5	1.2	80	2.5 x I_{th}	3	2000	22	11/12
4ME32	12	28	75	50/60	5 to 3000	2 x 5 to 2 x 600	1/5	1.2	80	2.5 x I_{th}	3	5000	65	13
4ME34	24	50	125	50/60	5 to 3000	2 x 5 to 2 x 600	1/5	1.2	80	2.5 x I_{th}	3	5000	65	13
4ME36	36	70	170	50/60	5 to 3000	2 x 5 to 2 x 600	1/5	1.2	80	2.5 x I_{th}	3	5000	65	14
4ME38	52	95	250	50/60	5 to 3000	2 x 5 to 2 x 600	1/5	1.2	80	2.5 x I_{th}	3	5000	65	15

1) Also possible on request: U_m = 17.5, U_d = 38 kV and U_p = 75 kV

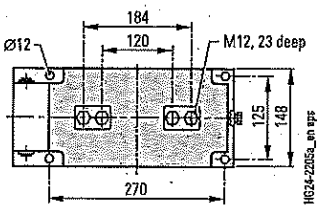
Size specification for 4MC2 transformers

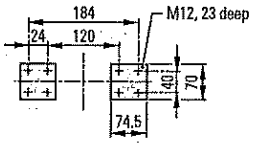
10th to 14th position of Order No.	6th to 9th position of Order No.												
	43-0P	48-0Q	56-0S	63-0T	67-0U	70-0V	73-0X	75-1A	76-1B	78-1D	82-1F	84-1G	86-1H
Sizes of 4MC22 transformers													
C20-0A	1	0	0	0	0	0	0	0	0	0	0	0	21
C30-0A	2	0	0	0	0	0	0	0	0	0	0	0	21
E30-0A	1	0	0	0	0	0	0	0	0	0	0	0	21
E40-0A	2	0	0	0	0	0	0	0	0	0	0	0	21
H30-0A	0	0	0	0	0	0	0	0	0	0	0	0	21
H40-0A	1	2	2	2	2	2	2	2	2	2	2	2	21
Q30-0A	2	1	0	0	0	0	0	0	0	0	0	0	21
Q40-0A	2	1	1	1	0	0	0	0	0	0	0	0	21
Q60-0A	21	3	2	1	1	0	0	0	1	1	1	1	21
C20-4Q	3	2	1	0	0	0	0	0	0	0	0	0	21
C30-4Q	3	2	1	1	0	0	0	0	0	0	0	0	21
E30-3Q	3	2	1	0	0	0	0	0	0	0	0	0	21
E30-4Q	3	2	1	0	0	0	0	0	0	0	0	0	21
E40-4Q	3	2	1	0	0	0	0	0	0	0	0	0	21
E40-6Q	–	21	3	2	2	1	1	1	1	2	2	2	21
H30-3Q	1	1	0	0	0	0	0	0	0	0	0	0	21
H30-4Q	2	2	1	0	0	0	0	0	0	0	0	0	21
H40-4Q	2	2	1	0	0	0	0	0	0	0	0	0	21
H40-6Q	–	21	2	2	1	1	1	1	1	2	2	2	21
Sizes of 4MC24 transformers													
C20-0A	1	1	1	1	1	1	1	1	1	1	1	11	11
C30-0A	1	1	1	1	1	1	1	1	1	1	1	11	11
E30-0A	1	1	1	1	1	1	1	1	1	1	1	11	11
E40-0A	1	1	1	1	1	1	1	1	1	1	1	11	11
H30-0A	1	1	1	1	1	1	1	1	1	1	1	11	11
H40-0A	1	1	1	1	1	1	1	1	1	1	1	11	11
Q30-0A	1	1	1	1	1	1	1	1	1	1	1	11	11
Q40-0A	1	1	1	1	1	1	1	1	1	1	1	11	11
Q60-0A	11	2	1	1	1	1	1	1	1	1	1	11	11
C20-4Q	2	1	1	1	1	1	1	1	1	1	1	11	11
C30-4Q	2	1	1	1	1	1	1	1	1	1	1	11	11
E30-3Q	2	2	1	1	1	1	1	1	1	1	1	11	11
E30-4Q	2	2	1	1	1	1	1	1	1	1	1	11	11
E40-4Q	2	2	1	1	1	1	1	1	1	1	1	11	11
E40-6Q	–	11	2	1	1	1	1	1	1	1	1	11	11
H30-3Q	1	1	1	1	1	1	1	1	1	1	1	11	11
H30-4Q	1	1	1	1	1	1	1	1	1	1	1	11	11
H40-4Q	2	1	1	1	1	1	1	1	1	1	1	11	11
H40-6Q	–	11	2	1	1	1	1	1	1	1	1	11	11
Sizes of 4MC26 transformers													
C20-0A	1	1	1	1	1	1	1	1	1	1	01	01	01
C30-0A	1	1	1	1	1	1	1	1	1	1	01	01	01
E30-0A	1	1	1	1	1	1	1	1	1	1	01	01	01
E40-0A	1	1	1	1	1	1	1	1	1	1	01	01	01
H30-0A	1	1	1	1	1	1	1	1	1	1	01	01	01
H40-0A	1	1	1	1	1	1	1	1	1	1	01	01	01
Q30-0A	1	1	1	1	1	1	1	1	1	1	01	01	01
Q40-0A	1	1	1	1	1	1	1	1	1	1	01	01	01
Q60-0A	–	01	1	1	1	1	1	1	1	1	01	01	01
C20-4Q	01	1	1	1	1	1	1	1	1	1	01	01	01
C30-4Q	01	1	1	1	1	1	1	1	1	1	01	01	01
E30-3Q	01	1	1	1	1	1	1	1	1	1	01	01	01
E30-4Q	01	1	1	1	1	1	1	1	1	1	01	01	01
E40-4Q	01	1	1	1	1	1	1	1	1	1	01	01	01
E40-6Q	–	–	1	1	1	1	1	1	1	1	01	01	01
H30-3Q	1	1	1	1	1	1	1	1	1	1	01	01	01
H30-4Q	1	1	1	1	1	1	1	1	1	1	01	01	01
H40-4Q	01	1	1	1	1	1	1	1	1	1	01	01	01
H40-6Q	–	–	1	1	1	1	1	1	1	1	01	01	01

Dimension drawings for current transformers

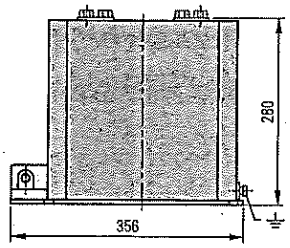


Dimension drawing 1

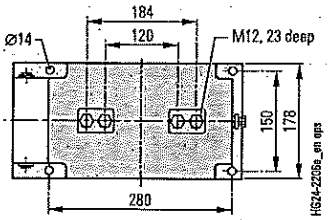


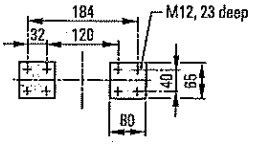


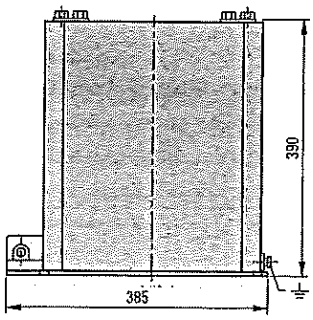
Primary connection ≥ 1500 A



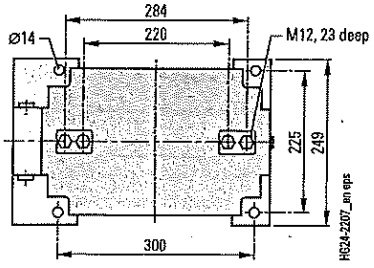
Dimension drawing 2

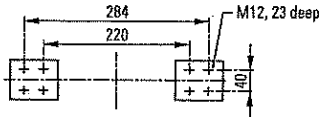




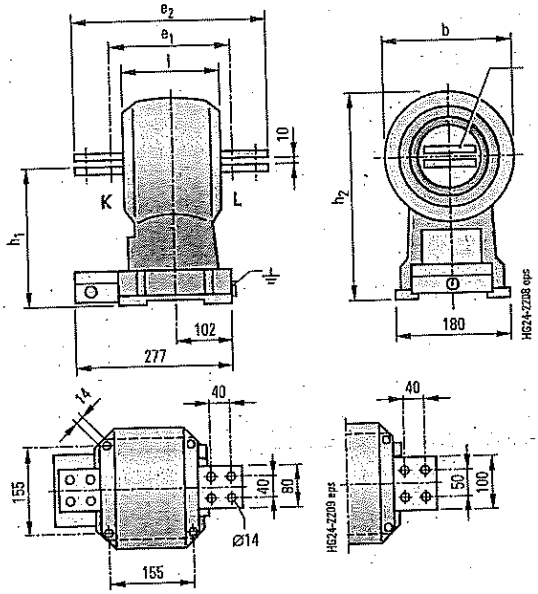


Dimension drawing 3





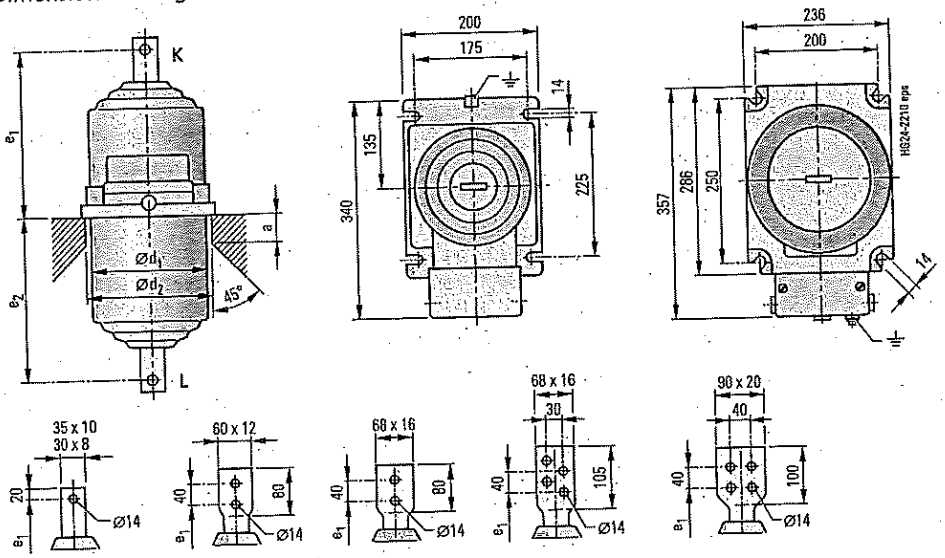
3



Type	b	e_1	e_2	h_1	h_2	l
4MB12, size 1	214	210	350	235	342	176
4MB12, size 2	260	230	350	295	425	196
4MB13	273	–	–	288	425	300
4MB14	260	230	350	295	425	196

Current ratings	Bars
Up to 1500 A	2 x 50 x 10
1500 A to 2500 A	2 x 80 x 10
2500 A to 3000 A	2 x 80 x 10 or 3 x 80 x 10
3000 A to 4000 A	3 x 80 x 10 or 3 x 100 x 10

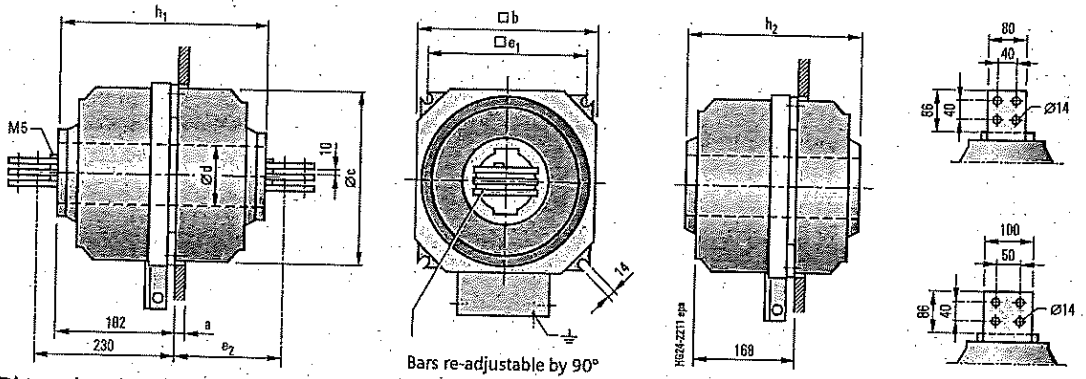
Dimension drawing 4



Dimension drawing 5

Type	Size	a max. mm	d_1 mm	d_2 mm	e_1 up to 1500 A mm	e_1 2000 A mm	e_1 up to 3000 A[1] mm	e_2 up to 1500 A mm	e_2 2000 A mm	e_2 up to 3000 A[1] mm	Weight approx. kg
4MC22	0	50	180	185	190	195	215	150	155	175	12 to 18
	1	60	180	185	190	195	215	210	215	235	16 to 22
	2	115	180	185	255	260	280	270	275	295	28 to 32
	3	195	180	185	315	320	340	330	335	355	35 to 40
	21	150	230	235	280	285	315	290	295	325	40 to 48
4MC24	1	60	180	185	255	260	280	270	275	295	28 to 32
	2	140	180	185	315	320	340	330	335	355	35 to 40
	11	100	230	235	280	285	315	290	295	325	40 to 48
4MC26	1	60	180	185	315	320	340	330	335	355	35 to 40
	01	50	230	253	280	285	315	290	295	325	40 to 48

1) Design for rated primary current 3000 A only available in size 21, 11 or 01



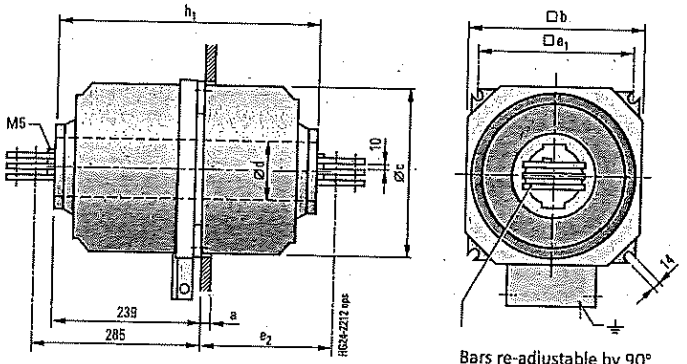
Dimension drawing 6

Size	a_{max}	b	Ø c	Ø d	e_1	e_2	h_1	h_2
11	10	295	278	115	255	175	313	285
12	60	295	278	115	255	250	288	360
21	10	370	356	115	325	175	313	285
22	60	370	356	115	325	250	288	360
31	10	370	356	155	325	–	–	285
32	60	370	356	155	325	–	–	360
41	10	440	440	205	490	–	–	285
42	60	440	440	205	490	–	–	360
51	10	530	530	297	490	–	–	285
52	60	530	530	297	490	–	–	360
61	10	530	530	310	490	–	–	–
62	60	530	530	310	490	–	–	–
72	10	650	650	380	600	–	–	–
73	60	650	650	380	600	–	–	–

Conductor bars

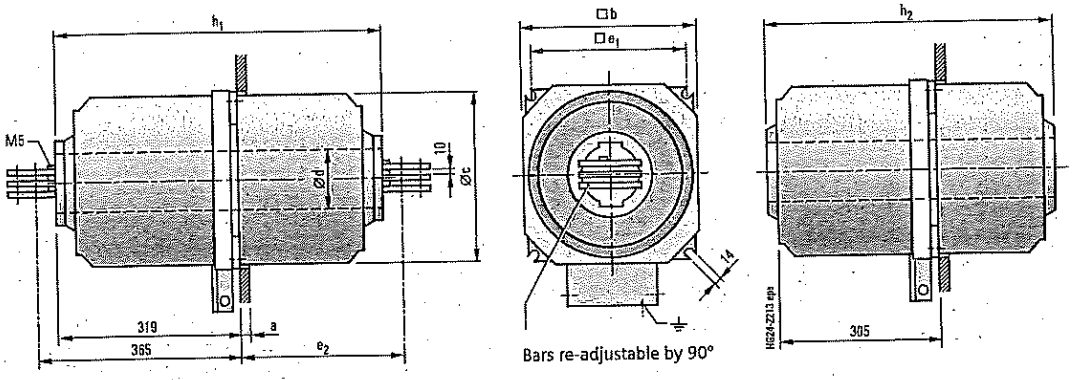
Normal designs

2000 A: 2 bars, 80 x 10 mm
2500 A: 2 bars, 100 x 10 mm
3000 A: 3 bars, 80 x 10 mm
4000 A: 3 bars, 100 x 10 mm



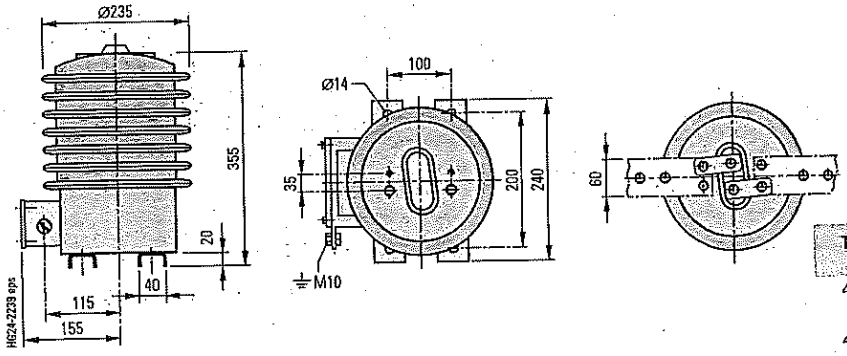
Dimension drawing 7

Size	a_{max}	b	Ø c	Ø d	e_1	e_2	h_1	h_2
11	10	295	278	115	255	230	427	399
12	60	295	278	115	255	305	502	474
21	10	370	356	115	325	230	427	399
22	60	370	356	115	325	305	50	474
31	10	370	356	155	325	–	–	399
32	60	370	356	155	325	–	–	474
41	10	440	440	205	490	–	–	399
42	60	440	440	205	490	–	–	474
51	10	530	530	297	490	–	–	399
52	60	530	530	297	490	–	–	474
61	10	530	530	310	490	–	–	399
62	60	530	530	310	490	–	–	474
72	10	650	650	380	600	–	–	–
73	60	650	650	380	600	–	–	–



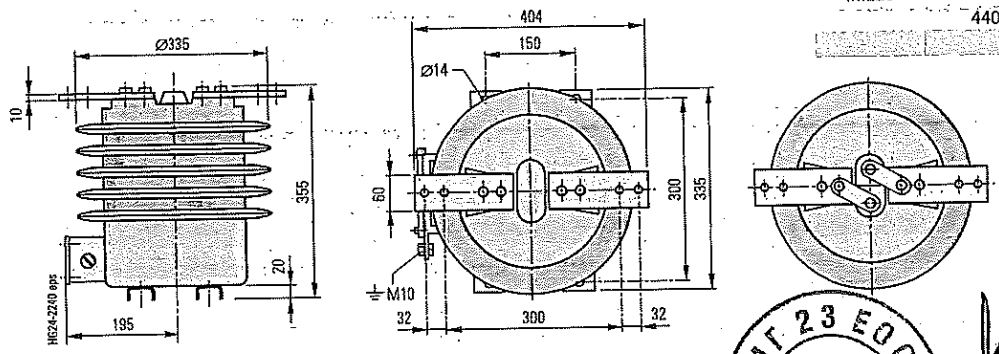
Dimension drawing 8

Size	a_{max}	b	Ø c	Ø d	e_1	e_2	h_1	h_2
11	10	295	278	115	255	175	313	285
12	60	295	278	115	255	250	288	360
21	10	370	356	115	325	175	313	285
22	60	370	356	115	325	250	288	360
31	10	370	356	155	325	–	–	285
32	60	370	356	155	325	–	–	360
41	10	440	440	205	490	–	–	285
42	60	440	440	205	490	–	–	360
51	10	530	530	297	490	–	–	285
52	60	530	530	297	490	–	–	360
61	10	530	530	310	490	–	–	–
62	60	530	530	310	490	–	–	–
72	10	650	650	380	600	–	–	–
73	60	650	650	380	600	–	–	–

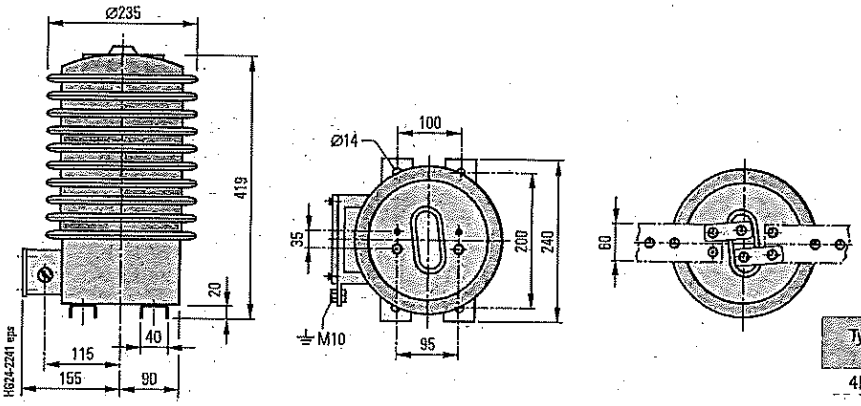


Dimension drawing 9

Type	Arcing distance	Creepage distance
4ME22	229	486
	310	400
4ME24	229	486
	440	1010
4ME26	405	945
	440	1010

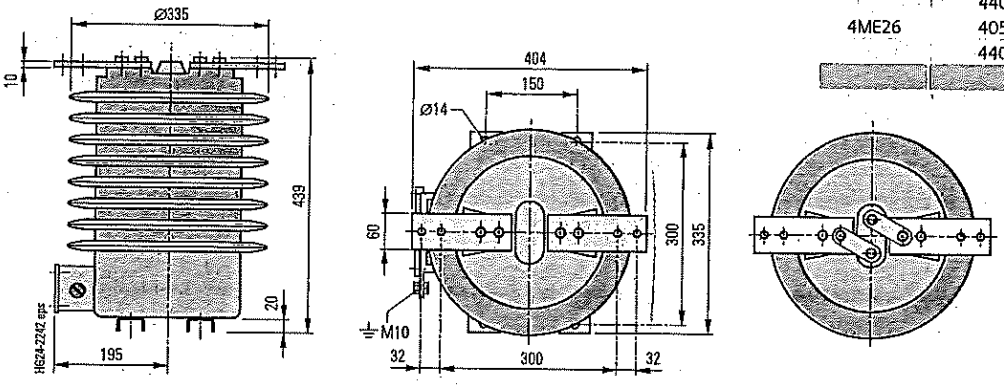


Dimension drawing 10

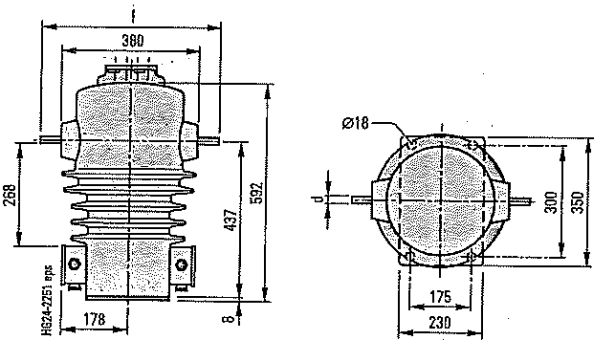


Dimension drawing 11

Type	Arcing distance	Creepage distance
4ME22	229	486
	310	400
4ME24	229	486
	440	1010
4ME26	405	945
	440	1010

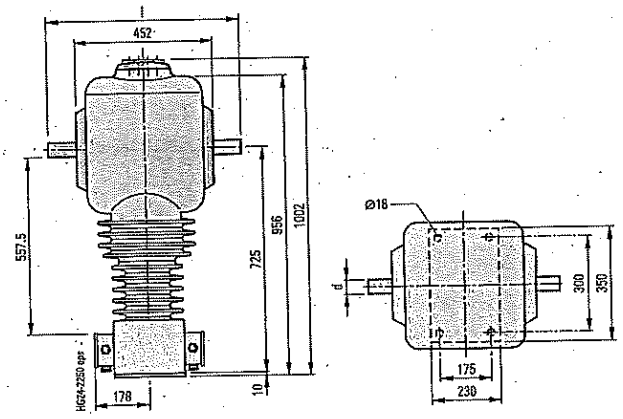


Dimension drawing 12



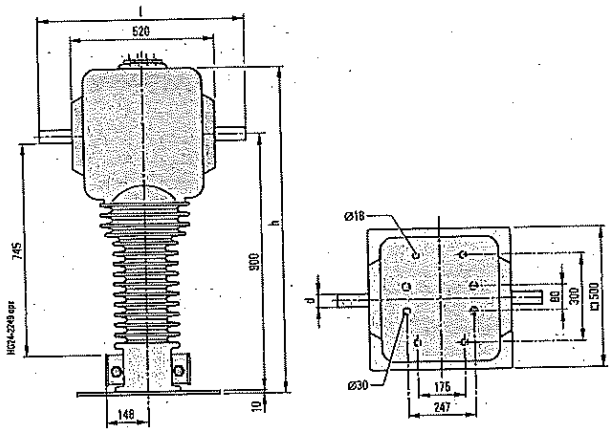
Dimension drawing 13

I_{PN}	d	l	Arcing distance	Creepage distance
Up to 600 A	20	500	268	665
600 to 1250 A	30	560	268	665
1250 to 2000 A	42	600	268	665
2000 to 3000 A	48	620	268	665



I_{PN}	d	l	Arcing distance	Creepage distance
Up to 600 A	20	572	557.5	1290
600 to 1250 A	30	632	557.5	1290
1250 to 2000 A	42	672	557.5	1290
2000 to 3000 A	48	692	557.5	1290

Dimension drawing 14



I_{PN}	d	l	h	Arcing distance	Creepage distance
500 A	30	700	1125	745	1823
Up to 1250 A	30	700	1188	745	1823
1250 to 2000 A	42	740	1188	745	1823
2000 to 3000 A	45	760	1188	745	1823
2x 600 A	30	700	1217	745	1823

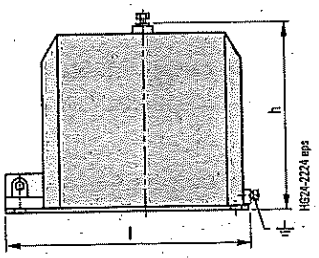
Dimension drawing 15

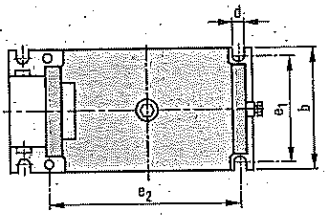
Terminal designations of current transformers

Transformer design	Designation of connection terminals acc. to VDE	acc. to IEC	Example for rated current data
1 primary winding 1 secondary winding	K L k l	P1 P2 S1 S2	100/1 A
2 equivalent primary windings 1 secondary winding	Ka Kb La Lb k l	P1 C1 C2 P2 S1 S2	2 x 100/1 A
with primary multi-ratio			
1 primary winding 1 secondary winding with tappings	K L k l3 l2 l1	P1 P2 S1 S2 S3 S4	1000–800 ... 200/1A
with secondary multi-ratio, highest rated current at l1 or S4			
1 primary winding 2 or more secondary windings on separate cores	K L 1k 1l 2k 2l	P1 P2 1S1 1S2 2S1 2S2	100/1/1 A

Order No.	Operating voltage (maximum value) U_m kV	Rated short-duration power-frequency withstand voltage U_d kV	Rated lightning impulse withstand voltage U_r kV	Rated frequency Hz	Maximum rated primary voltage U_{PN} kV	Multi-ratio U_{SN} kV	Thermal limiting output S_{th} VA	Rated voltage factor (8h)	Rated thermal limiting output of the residual voltage winding VA/A	Short-time load (mechanical) N	Weight kg	Catalog dimension drawing
4MR12	12	28	75	50/60	$11.5/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	350	1.9	230/4	–	18	16
4MR14	24	50	125	50/60	$22/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	500	1.9	230/4	–	28	16
4MR22	12	28	75	50/60	11.5	100; 110; 120	400	–	–	–	18	17
4MR24	24	50	125	50/60	22	100; 110; 120	400	–	–	–	30	17
4MR52	12	28	75	50/60	$11.5/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	600	1.9	350/6	–	25	18
4MR54	24	50	125	50/60	$22/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	600	1.9	350/6	–	35	18
4MR56	36	70	170	50/60	$35/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	800	1.9	350/6	–	60	18
4MR62	12	28	75	50/60	11.5	100; 110; 120	600	–	–	–	25	19
4MR64	24	50	125	50/60	22	100; 110; 120	600	–	–	–	35	19
4MR66	36	70	170	50/60	35	100; 110; 120	800	–	–	–	70	19
4MS32	12	28	75	50/60	$12/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	400	1.9	230/4	1000	72	20
4MS34	24	50	125	50/60	$22/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	400	1.9	230/4	1000	75	20
4MS36	12	28	75	50/60	$35/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	400	1.9	230/4	1000	79	20
4MS38	52	70	250	50/60	$50/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	800	1.9	500/9	1000	79	20
4MS42	12	28	75	50/60	12	100; 110; 120	500	–	–	1000	73	21
4MS44	24	50	125	50/60	22	100; 110; 120	500	–	–	1000	76	21
4MS46	12	28	75	50/60	35	100; 110; 120	900	–	–	1000	82	21
4MS52	12	28	75	50/60	$12/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	400	1.9	230/4	1000	35.5	22
4MS54	24	50	125	50/60	$22/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	400	1.9	230/4	1000	35.5	22
4MS56	36	28	75	50/60	$35/\sqrt{3}$	$100/\sqrt{3}$; $110/\sqrt{3}$; $120/\sqrt{3}$	400	1.9	230/4	1000	51	23
4MS62	12	28	75	50/60	12	100; 110; 120	500	–	–	1000	37	24
4MS64	24	50	125	50/60	22	100; 110; 120	500	–	–	1000	37	24
4MS66	36	28	75	50/60	35	100; 110; 120	500	–	–	1000	57	25

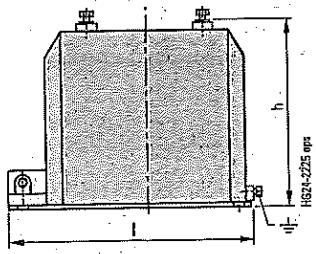
Dimension drawings for voltage transformers

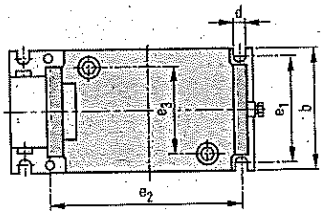




Dimension drawing 16

Type	b	h	l	e_1	e_2	d
4MR12	148	220	335	125	270	11
4MR14	178	280	357	150	280	14

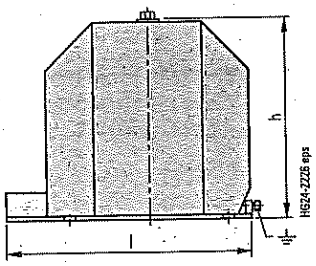


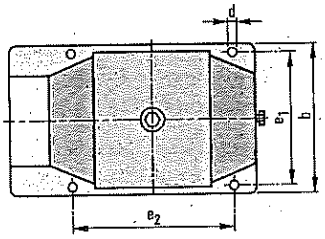


Dimension drawing 17

Type	b	h	l	e_1	e_2	e_3	d
4MR12	148	220	335	125	270	110	11
4MR14	178	280	357	150	280	130	14

3

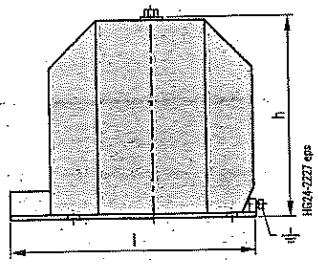


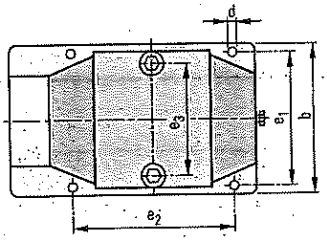


Dimension drawing 18

Type	b	h	l	e_1	e_2	d
4MR52	200	240	342	175	225	11
4MR54	225	300	370	200	250	14
4MR54 [1]	200	300	324	175	225	14
4MR56	249	390	395	225	300	14

1) Design on request

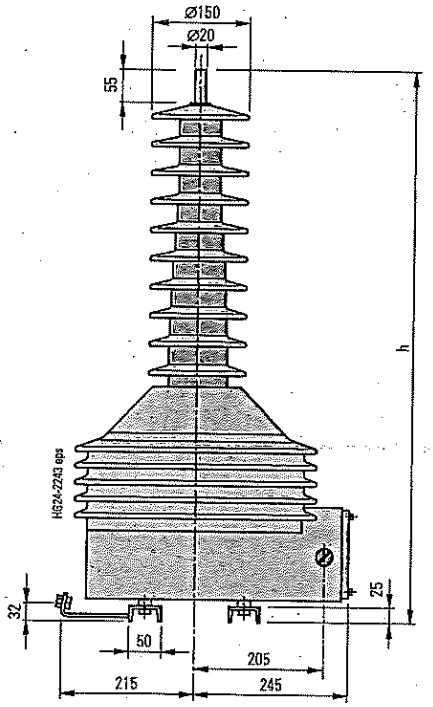




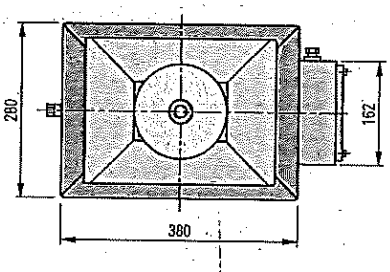
Dimension drawing 19

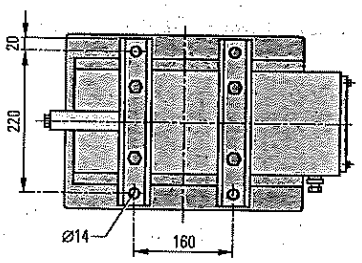
Type	b	h	l	e_1	e_2	e_3	d
4MR62	200	240	342	175	225	150	11
4MR64	225	300	370	200	250	210	14
4MR64 [1]	200	260	324	175	225	155	14
4MR66	249	390	395	225	300	320	14

1) Design on request

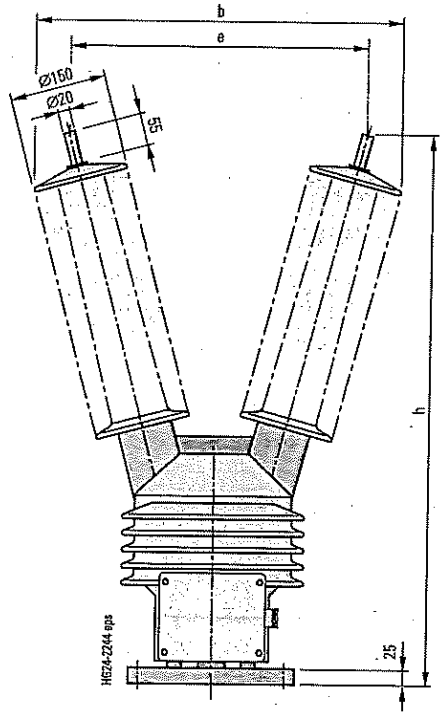


Type	h	Arcing distance	Creepage distance	Number of sheds
4MS32	520	420	790	2
4MS34	655	550	1055	5
4MS36	880	760	1615	10
4MS38	880	760	1615	10

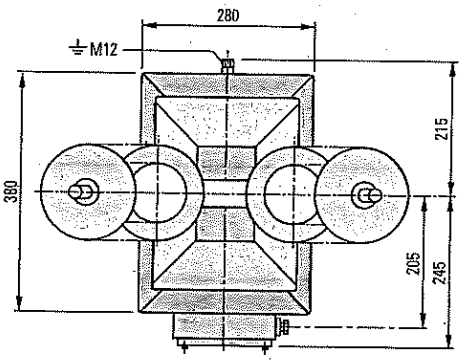


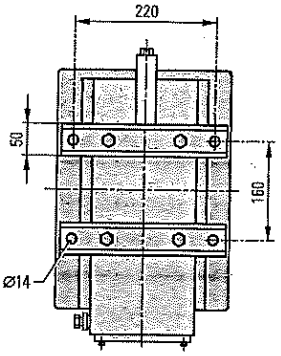


Dimension drawing 20

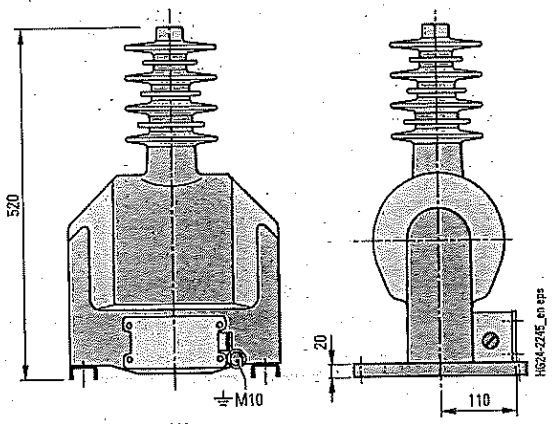


Type	h	b	e	Arcing distance	Creepage distance	Number of sheds
4MS42	515	375	270	420	760	2 x 2
4MS44	645	445	340	550	1035	2 x 5
4MS46	865	560	455	760	1595	2 x 10

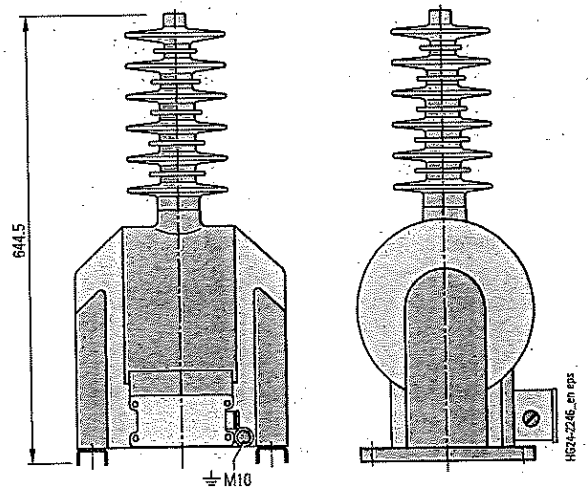




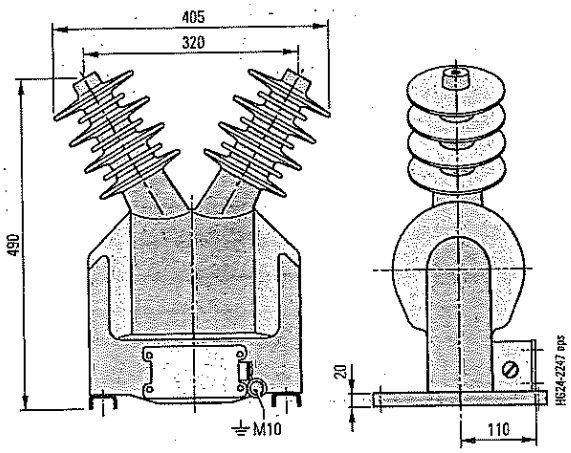
Dimension drawing 21



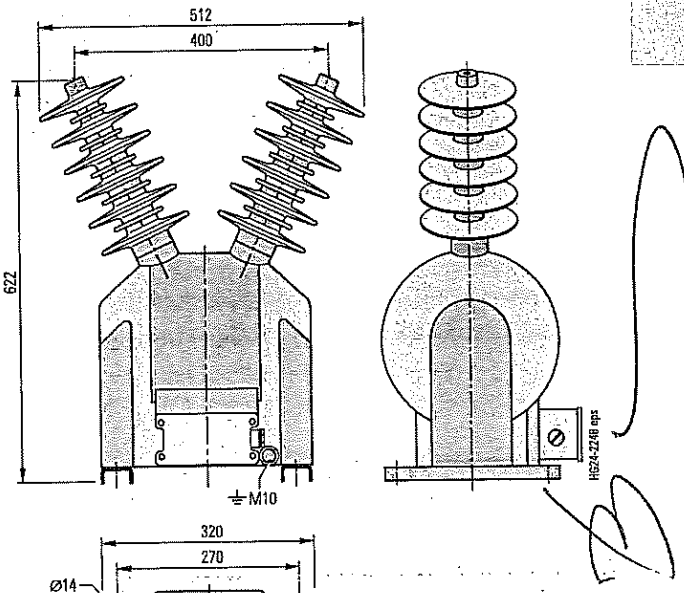
Dimension drawing 22



Dimension drawing 23

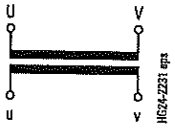
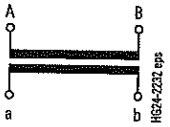
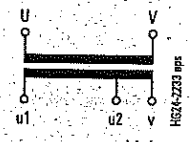
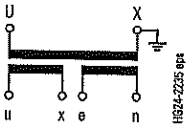
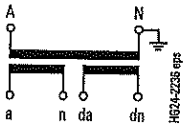


Dimension drawing 24



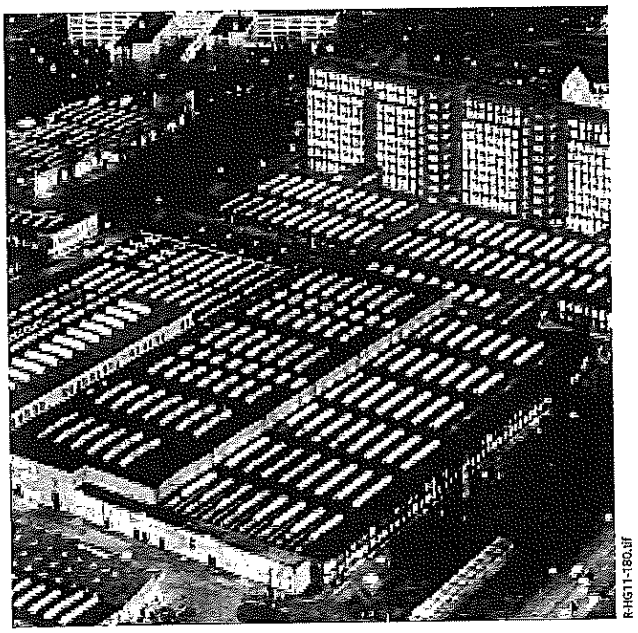
Dimension drawing 25

Terminal designations of the voltage transformers

Transformer design	Designation of the connection terminals acc. to VDE	acc. to IEC	Example for low-voltage data
Unearthed 1 secondary winding			10000/100 V
Unearthed 1 secondary winding with tappings			5000–10000/100 V
	highest rated voltage at u1 or a1		
Earthed 1 measuring winding 1 auxiliary residual voltage winding			10000/$\sqrt{3}$ / 100/$\sqrt{3}$ / 100/3 V

3

Brandenburg Gate, Berlin, Germany



Switchgear Factory Berlin, Germany

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Annex **83**

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Configuration instructions 85

Configuration aid Foldout page

4

Please copy, fill in and return to your Siemens partner.

Inquiry concerning

- ☐ 4MA7 current transformer
- ☐ 4MB1 current transformer
- ☐ 4MC2 current transformer
- ☐ 4MC3 current transformer
- ☐ 4ME2 current transformer
- ☐ 4ME3 current transformer
- ☐ 4MR voltage transformer
- ☐ 4MS voltage transformer

Please

- ☐ Submit an offer
- ☐ Call us
- ☐ Visit us

Your address

Company

Dept.

Name

Street

Postal code/city

Phone

Fax

E-mail

Siemens AG

Dept.

Name

Street

Postal code/city

Fax

Technical data of current transformer

				Other values
Operating voltage	☐ 12 kV ☐ 36 kV	☐ 17.5 kV ☐ 52 kV	☐ 24 kV	☐ ___ kV
Rated lightning impulse withstand voltage	☐ 75 kV ☐ 170 kV	☐ 95 kV ☐ 250 kV	☐ 125 kV	☐ ___ kV
Rated short-duration power-frequency withstand voltage	☐ 28 kV ☐ 70 kV	☐ 38 kV ☐ 95 kV	☐ 50 kV	☐ ___ kV
Rated primary current	☐ ___ A	☐ 2x___ A		
Secondary current	☐ 1 A	☐ 5 A		
Thermal strength	☐ 100 x I_{PN} ☐ 300 x I_{PN} ☐ 600 x I_{PN}	☐ 150 x I_{PN} ☐ 400 x I_{PN} ☐ 800 x I_{PN}	☐ 200 x I_{PN} ☐ 500 x I_{PN} ☐ 1000 x I_{PN}	☐ ___ x I_{PN}
1st core	☐ Protection core ☐ Measuring core	☐ ___ Class ☐ ___ Class	☐ ___ Factor ☐ ___ Factor	☐ ___ VA ☐ ___ VA
2nd core	☐ Protection core ☐ Measuring core	☐ ___ Class ☐ ___ Class	☐ ___ Factor ☐ ___ Factor	☐ ___ VA ☐ ___ VA
3rd core	☐ Protection core ☐ Measuring core	☐ ___ Class ☐ ___ Class	☐ ___ Factor ☐ ___ Factor	☐ ___ VA ☐ ___ VA

Technical data of voltage transformer

				Other values
Maximum operating voltage	☐ 12 kV ☐ 36 kV	☐ 24 kV ☐ 52 kV		☐ ___ kV
Rated lightning impulse withstand voltage	☐ 75 kV ☐ 170 kV	☐ 95 kV ☐ 250 kV	☐ 125 kV	☐ ___ kV
Rated short-duration power-frequency withstand voltage	☐ 28 kV ☐ 70 kV	☐ 38 kV ☐ 95 kV	☐ 50 kV	☐ ___ kV
Rated primary voltage	☐ ___ kV	☐ ___ $/\sqrt{3}$		
Rated secondary voltage	☐ 100 V ☐ 100$/\sqrt{3}$ V	☐ 110 V ☐ 110$/\sqrt{3}$ V	☐ 120 V ☐ 120$/\sqrt{3}$ V	☐ ___ V ☐ ___ $/\sqrt{3}$ V
Auxiliary residual voltage winding	☐ Without	☐ 100/3 V	☐ 110/3 V	☐ 120/3 V
Rated output of the measuring winding	☐ Class 0.2 ☐ 20 VA	☐ Class 0.5 ☐ 50 VA	☐ Class 1 ☐ 100 VA	☐ ___ VA

Application and other requirements

☐ Please check off

___ Please fill in

You prefer to configure your instrument tr[illegible]ner on your own?

Please follow the steps for configuration and enter the [illegible]number in the configuration aid.

For configuration of your
4M protective and measuring transformers

Instruction for configuration of the 4M protective and measuring transformers

1st step: Definition of the current transformer

Please specify the following ratings:	Possible options:
Transformer design	Block-type transformer, bushing-type transformer, outdoor transformer, etc.
Operating voltage (U_m)	U_m: 12 kV to 52 kV
Rated lightning impulse withstand voltage (U_p)	U_p: 75 kV to 250 kV
Rated short-duration power-frequency withstand voltage (U_d)	U_d: 28 kV to 95 kV
Rated primary current (I_{PN})	I_{PN}: 20 A to 10000 A
Secondary current (I_{SN})	I_{SN}: 1 A or 5 A
Thermal strength	100 x I_{PN} to 1000 I_{PN}
Core data	Quantity, type, class, factor and rating of cores

These ratings define the positions 3 to 15 of the order number of the current transformer.

2nd step: Definition of the voltage transformer

Please specify the following ratings:	Possible options:
Transformer design	Block-type transformer, outdoor transformer
Number of phases	Single-phase or double-phase
Operating voltage (U_m)	U_m: 12 kV to 52 kV
Rated lightning impulse withstand voltage (U_p)	U_p: 75 kV to 250 kV
Rated short-duration power-frequency withstand voltage (U_d)	U_d: 28 kV to 95 kV
Rated primary voltage (U_{PN})	U_{PN}: 3.3 kV to 45 kV or values divided by $\sqrt{3}$
Rated secondary voltage (U_{SN})	U_{SN}: 100 V, 110 V, 120 V or values divided by $\sqrt{3}$
Rated output of the measuring winding	25 VA, class 0.2 up to 400 VA, class 1

These ratings define the positions 3 to 11 of the order number of the voltage transformer.

3rd step: Do you have any further requirements concerning the equipment?

Should you still need more options than the possible equipment like terminal designations according to VDE or IEC, selection of sizes, routine test certificate, etc., please contact your responsible sales partner.

1 2 3 4 5 6 7 – 8 9 10 11 12 – 13 14 15 16

4 M – – – –

+ + + + + + + +

4 M – – – –

+ + + + + + + +

4 M – – – –

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4 M – – – –

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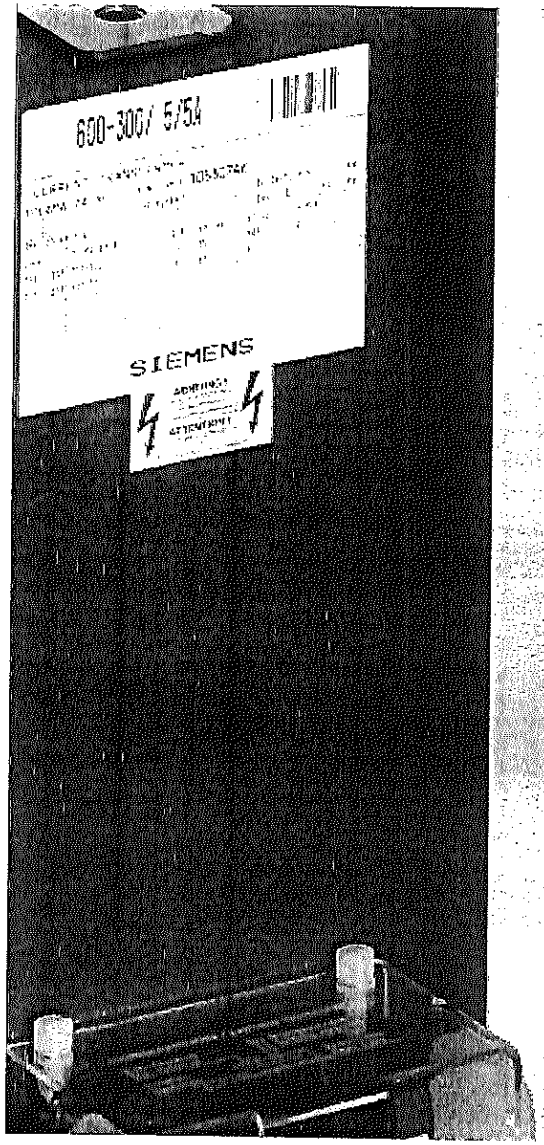

Published by and copyright © 2009:
Siemens AG
Energy Sector
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Order No.: E50001-K1524-A101-A3-7600
Printed in Germany
Dispo 31601, c4bs 7460
KG 05.09 2.0 88 En
6101/15477 480488

Printed on elementary chlorine-free bleached paper.

Responsible for

Technical contents:
Siemens AG, E D MV C I LM
Berlin

General editing:
Siemens AG, E CC MCC G
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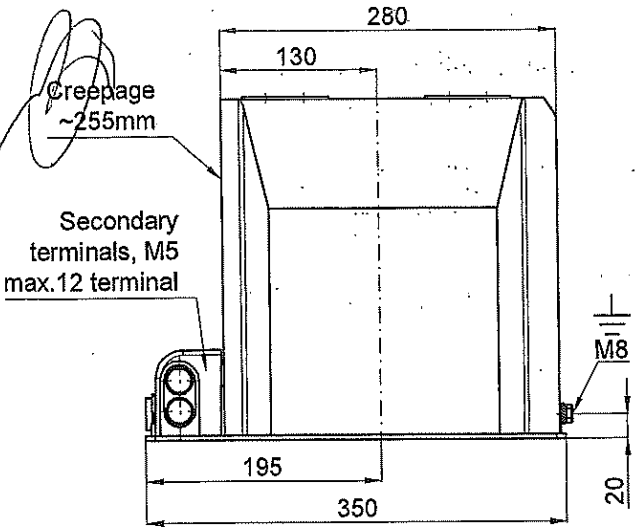
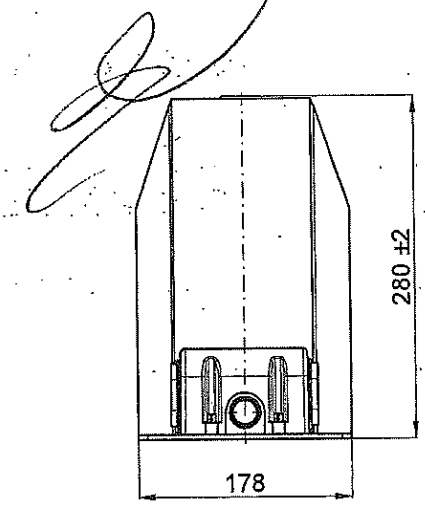
www.siemens.com/energy

SIEMENS Technical Specification No :2-A359-303





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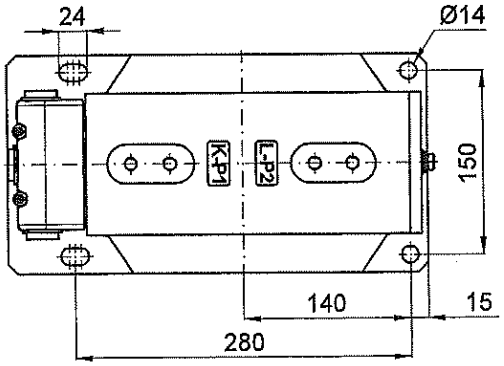

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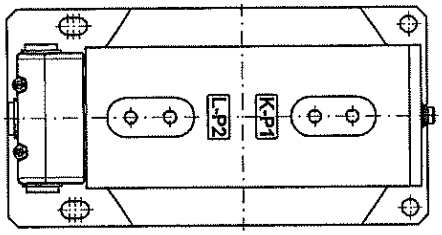
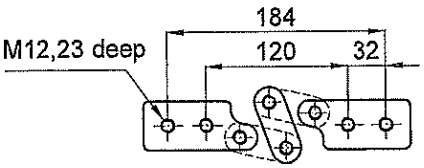
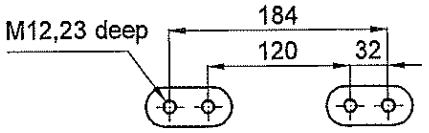


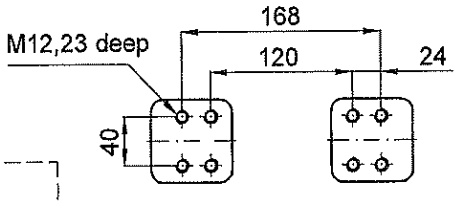
PRIMARY CONNECTION TERMINALS



In ≤ 2x600A

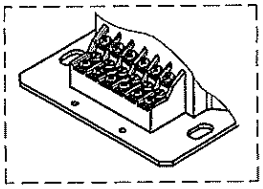


up to 600A (Brass)
600A<In<1500A (ECu)



1500A ≤ In ≤ 4000A

Screw	Tightening Torque Nm
M5	4
M8	16-20
M12	60-70



Secondary terminal's detail

DEĞİŞİKLİK
TEKNİK BÜRO
Tarih 01 / 06 / 2016

QTY	DESCRIPTION	POS	DIMENSIONS	WEIGHT	PART OR DIN NO.	MATERIAL

NO	DATE	NAME	MODIFICATION
L	01-03-16	Arzu	Design was changed.

PLATE CODE	3012375
BOX CODE	3009583
REV.	L

TOLERANS DIN ISO 2768-1 (c)

SCALE -/-

4MA74
CURRENT TRANSFORMER
SIEMENS

REPLACES THE DRAWING NO.

DR'N
CH'D
APP'D
C.C

ALCE TRANSFORMING SUPPORTING

OG Ölçü Trafo

416

РЕПУБЛИКА БЪЛГАРИЯ
Български институт по метрология

REPUBLIC OF BULGARIA
Bulgarian Institute of Metrology

ДОПЪЛНЕНИЕ № 17.01.5109.1

КЪМ УДОСТОВЕРЕНИЕ
ЗА ОДОБРЕН ТИП СРЕДСТВО ЗА ИЗМЕРВАНЕ № 16.11.5109
Measuring Instrument Type-approval Certificate-Revision 1

Издадено на производител: *Issued to manufacturer:*	SIEMENS AG - Germany Wittelsbacherplatz 2, D-80333 Munich, Germany
На основание на: *In Accordance with:*	Чл. 32, ал.1 от Закона за измерванията
Относно: *In Respect of:*	измервателни токови трансформатори тип 4MAxx
Технически и метрологични характеристики: *Technical and metrological characteristics:*	приложение, неразделна част от настоящото удостоверение за одобрен тип средство за измерване
Срок на валидност: *Valid until:*	15.11.2026 г.
Средството за измерване е вписано в регистъра на одобрените за използване типове средства за измерване под №: *Reference №:*	5109
Дата на издаване на допълнението към удостоверението за одобрен тип: *Date:*	05.01.2017 г.

На основание чл.36а ал.3 от ЗОП

И.Д. ПРЕ

ВЯРНО С ОРИГИНАЛА

МИГ 23 ЕООД • MIG 23 LTD • СОФИЯ

Издадено на производител: SIEMENS AG - Germany
Wittelsbacherplatz 2, D-80333 Munich, Germany

Относно: измервателни токови трансформатори тип 4MAxx

Описание на допълнение № 17.01.5109.1 към удостоверение за одобрен тип № 16.11.5109:

Към т.2 **Технически и метрологични характеристики** се добавя към **Мощност, VA/клас на точност:** от **5** до 15/0,2S; 0,2

Таблицата от т.2 Технически и метрологични характеристики добива вида:

Характеристика	**Трансформатор тип 4MAxx**		
	4MA72	**4MA74**	**4MA76**
Максимално работно напрежение, kV	до 12	до 24	до 36
Номинален първичен ток, A	до 4000		
Номинален вторичен ток, A	1 и 5		
Честота, Hz	50		
Клас на точност **- измервателна намотка** **- защитна намотка**	0,2S; 0,2; 0,5S; 0,5; 1 5P10; 10P10		
Мощност, VA/клас на точност	от 5 до 15/0,2S; 0,2 от 5 до 30/0,5S; 0,5; 1 от 5 до 30/5P10; 10P10		

ВЯРНО С ОРИГИНАЛА

BIG 23 LTD. СОФИЯ

INSTITUT „PRÜFFELD FÜR ELEKTRISCHE HOCHLEISTUNGSTECHNIK" GMBH
IPH BERLIN

Independent, accredited test laboratory · Registration with STLA and LOVAG

TYPE TEST REPORT

NO. 1416.0077.3.032

Siemens Sanayi ve Tic. A. Ş. Power Transmission and Distribution (PTD) Yakacik Yolu No: 111 81430 Kartal-ISTANBUL (TURKEY)	CLIENT
ALCE Elektrik Sanayi ve Ticaret A. Ş.	MANUFACTURER
Block-type current transformer	TEST OBJECT
4MA74	TYPE
03/00811	MANUFACTURING NO.

RATED CHARACTERISTICS GIVEN BY THE CLIENT

Rated primary current	1250 A
Rated secondary current	5 - 5 A
Rated frequency	50 - 60 Hz
Rated output	15 - 15 VA
Accuracy class	0.5FS5 - 5P10
Highest voltage for equipment	24 kV
Rated power-frequency withstand voltage	50 kV
Rated lightning impulse withstand voltage	125 kV
Rated short-time thermal current (I_{th}) 3 s	31.5 kA
Rated dynamic current (I_{dyn})	80 kA

NORMATIVE DOCUMENT

IEC 60044-1: 1996-12, mod. + am1: 2000-07
STL Guide to the Interpretation of IEC 60044-1 1st Edition 1996-12

RANGE OF TESTS PERFORMED

- Impulse tests on the primary winding
- Determination of errors
- Short-time current test
- Temperature-rise test

DATE OF TEST

24 February to 7 March 2003

TEST RESULT

The test object has PASSED the above-mentioned type tests performed at 50 Hz.

На основание чл.36а ал.3 от ЗОП

Berlin, 15 August 2003

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This test document consists of 30 sheets.

Distribution

Copy No.: 1

Copies Nos. 1 and 2 in English: ALCE Elektrik Sanayi ve Ticaret A. Ş.

ВЯРНО С ОРИГИНАЛА

1. Present at the test

Mr.	Moritz	IPH test engineer in charge
Mrs.	Hauschild	IPH test engineer
Mr.	Vogler	IPH test engineer
Mr.	Wittwer	IPH test engineer
Mr.	Çiftçioğlu	ALCE Elektrik Sanayi ve Ticaret A. Ş.

2. Test performed

- Lightning impulse test on the primary winding
- Determination of errors
- Short-time current test
- Temperature-rise test

3. Identity of the test object

3.1 Technical data and characteristics

The technical data and characteristics of the test object are defined by the following parameters and specified by the client.

Test object:	Block-type current transformer		
Type:	4MA74		
Manufacturer:	ALCE Elektrik Sanayi ve Ticaret A. Ş.		
Serial No.:	03/00811		
Year of manufacture:	2003		
Data:	Rated primary current (I_n)		1250 A
	Rated continuous thermal current (I_{cont})		1.2 x I_n
	Rated secondary current	core 1	5 A
		core 2	5 A
	Rated frequency		50 - 60 Hz
	Rated output	core 1	15 VA
		core 2	15 VA
	Accuracy class	core 1	0.5FS5
		core 2	5P10
	Rated dynamic current (I_{dyn})		80 kA
	Rated short-time thermal current (I_{th})		31.5 kA
	Duration of short-circuit		3 s
	Rated insulation level		
	Highest voltage for equipment (U_m)		24 kV
	Rated power-frequency withstand voltage		50 kV
	Rated lightning impulse withstand voltage (list 2)		125 kV
	Insulating material class		E
Characteristics:	Winding material	Primary winding	Cu
		Secondary winding, core 1	Cu
		Secondary winding, core 2	Cu
	Cross-section of windings	Primary winding	690 mm^2
		Secondary winding, core 1	2.55 mm^2
		Secondary winding, core 2	2.54 mm^2

3.2 Identity documents

The manufacturer confirms that the test object has been manufactured in compliance with the drawings given in this document. IPH did not verify this compliance in detail.
The identity of the test object is fixed by the following drawings and data submitted by the client:

Name of drawing	Drawing No.	Date of drawing	Author	Notes
4MA74 BLOCK-TYPE CURRENT TRANSFORMER	416	06.02.03	ALCE 2 Sheet 30	

Entry of test object at IPH: 13 February 2003

ВЯРНО С ОРИГИНАЛА

СОФИЯ

4. Impulse test on the primary winding

4.1 Test laboratory

High-voltage test laboratory, high-voltage hall 2

4.2 Normative document

IEC 60044-1: 1996-12, mod. + am1: 2000-07, Sub-clause 7.3.2

4.3 Required test parameters

Lightning impulse voltage 1.2/50 µs	125 kV	Peak value
Polarity		Positive and negative
Impulse sequence	1 Impulse	Full wave at approx. 50 % of test voltage (reference impulse)
	15 Impulses	Full wave at 100 % of test voltage
Atmospheric correction		Without

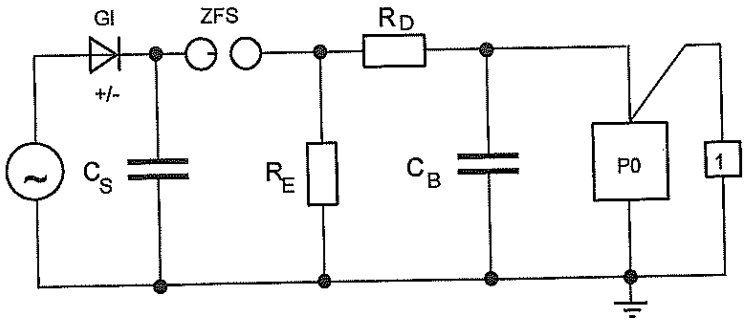
4.4 Test arrangement

The test voltage was applied between the connected terminals of primary winding and earth. The fastening screws, the core and the terminals of the secondary windings were earthed.

4.5 Test and measuring circuits

Technical data of test circuit

Impulse circuit:	Number of stages	n	=	2
	Impulse capacitance	C_S	=	70 nF
	Loading capacitance	C_B	=	1.5 nF
	Damping resistance	R_D	=	122 Ω
	Discharge resistance	R_E	=	1100 Ω



GI	Rectifier	R_D	Damping resistance
C_S	Impulse capacitance	C_B	Loading capacitance
ZFS	Spark gap	PO	Test object
R_E	Discharge resistance	1	Voltage measurement

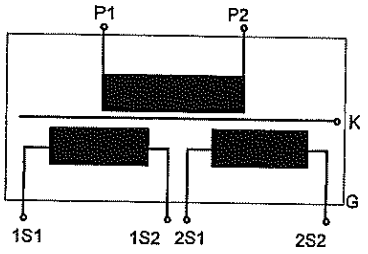
Figure 1: Test and measuring circuit for the lightning impulse voltage withstand test

Technical data of measuring circuit

Measuring point	Measured quantity	Measuring sensor/device	Technical parameters
1	Test voltage	R divider of SMR 10/770 type (TURD) with digital measuring instrument of DMI 551 type (Haefely) and LC 574 AL digital oscilloscope type (LeCroy)	Ratio 472.4

4.6 Test results

Front time of lightning impulse wave: 0.90 µs
Tail time of lightning impulse wave: 56.0 µs
Air temperature: 18.0 °C
Air pressure: 1001 mbar
Air humidity (relative): 50 %
Atmospheric correction of test voltage: Without

Circuit diagram of the test object			Test voltage	Impulse	Result
					
Test No.:	Voltage applied to	Earthed	kV		No. of impulses/ disruptive discharges
1003 0233 to 1003 0248	P1 and P2	1S1-1S2, 2S1-2S2 K, G	+62.5 +125	50 % FW impulse 100 % FW impulse	1/0 [1] 15/0 [1]
1003 0249 to 1003 0264	P1 and P2	1S1-1S2, 2S1-2S2 K, G	-62.5 -125	50 % FW impulse 100 % FW impulse	1/0 [1] 15/0 [1]

Notes:

1) The Appendices include only the oscillograms of the reference impulse and of each first and last 100 % full wave (FW) impulse.

4.7 Routine tests after the lightning impulse test

The routine tests to Sub-clause 6.2 of the normative document are part of the type test – lightning impulse test – and serve to assess the latter.

Results

Test	Test parameters	Test results	
Power-frequency withstand test on the primary winding	Test voltage: 50 kV Test frequency: 50 Hz Duration of test: 60 s	No disruptive discharge	o.k.
Partial discharge measurement	Procedure A Prestress duration: 60 s Measuring voltage (points 1 to 3): $1.2 \times U_m = 28.8$ kV $U_m = 24.0$ kV $1.2 \times U_m/\sqrt{3} = 16.6$ kV Measuring time: 30 s	 Partial discharge < 2.5 pC < 50 pC Partial discharge < 2 pC < 50 pC Partial discharge < 2 pC < 20 pC	o.k.
Power-frequency withstand test on the secondary windings	Test voltage: 3 kV Test frequency: 50 Hz Duration of test: 60 s	No disruptive discharge	o.k.
Interturn overvoltage test	Procedure A Test current (primary): 1250 A Test voltage (secondary 1): 373 V Test voltage (secondary 2): 1093 V Test frequency: 50 Hz Duration of test: 60 s	No disruptive discharge	o.k.

Notes:

The routine tests did not show anything that could have indicated a damage done to the test object during the previous lightning impulse test.

ВЯРНО С ОРИГИНАЛА

5. Determination of errors

5.1 Test laboratory

Low-voltage test laboratory, test room 3

5.2 Normative document

IEC 60044-1: 1996-12, mod. + am1: 2000-07, Sub-clauses 11.4 and 12.4

5.3 Required test parameters

Protective current transformer: The current errors shall be determined at 100 % of rated current and 100 % of rated burden.

Measuring current transformer: The current errors shall be determined at 5 %, 20 %, 100 % and 120 % of rated current and 25 % and 100 % of rated burden.

For a burden less than 5 VA a power factor of cos β = 1 shall be used, otherwise a power factor of cos β = 0.8 shall be applied.

The test frequency shall equal the rated frequency and be 50 Hz.

Maximum permissible error limits of current transformers for measuring and protecting purposes:

Accuracy class	Current error at percentage of rated current				Phase displacement at percentage of rated current			
	%				Minutes			
	5	20	100	120	5	20	100	120
0.5	1.5	0.75	0.5	0.5	90	45	30	30
5P	1				60			

5.4 Test arrangement

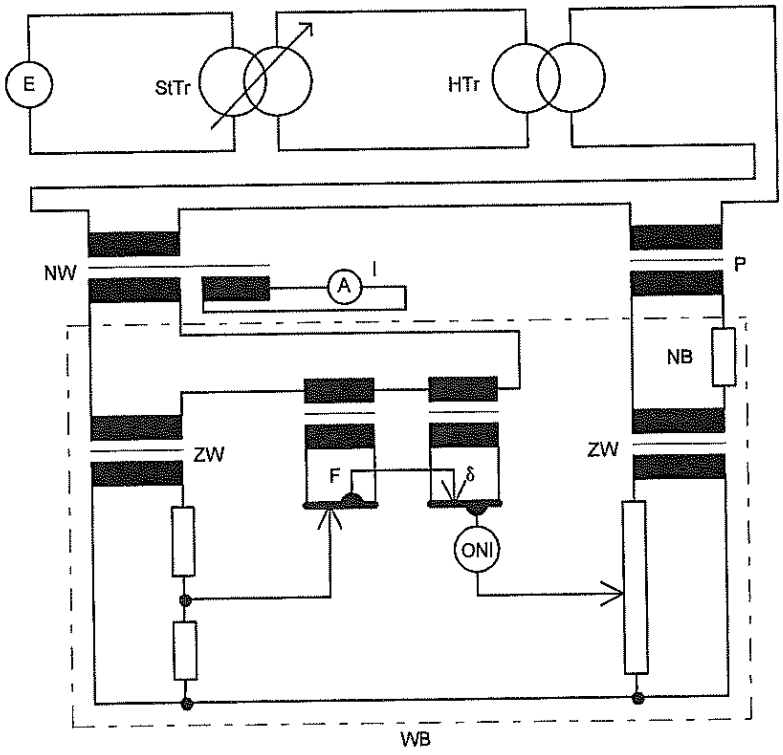
To IEC 60044-1: 1996, mod. + am1: 2000, Sub-clauses 11.4 and 12.4

After it had been demagnetised, the test object was connected via a matching transformer to an instrument transformer measuring device including a measurement standard transformer. An oscillographic null detector was used for the visual check of the comparison. The test object was subjected to the prescribed test conditions by connection of a standard burden.

5.5 Test and measuring circuits

Technical data of test and measuring circuits

Device	Type	Technical data
Standard current transformer NW	ITN 0.5a (TuR Dresden)	Ratio 5 A .. 3 kA / 5 and 5 A, resp. Class 0.1, 15 VA
Standard burden of current transformer NB	(AEG)	50 Hz, 1.25 .. 90 VA ß = 0.8/1, 1 .. 2 A
Instrument transformer measuring bridge I	Hohle type (AEG)	16 $^{2}/_{3}$, 50 and 60 Hz
Matching transformer to the bridge ZW	Hohle type (AEG)	Matching transformer for 1, 2, 5, 10 A
Null detector ONI	OIK (MWB)	20 mm/µV



E Power supply
StTr Adjusting transformer
HTr High-current transformer

Figure 2: Test and measuring circuit for the determination of errors

5.6 Test results

Rated current: 1250 A
Transformation ratio: 1250 A/5 A Burden: 15 VA, cos β = 0.8

At percentage of rated current	Errors		Permissible error for accuracy class 0.5	
	Current error	Phase displacement	Current error	Phase displacement
	%	Minutes	%	Minutes
120 %	0.11	-0.8	± 0.5	± 30
100 %	0.10	-0.9	± 0.5	± 30
20 %	-0.23	3.0	± 0.75	± 45
5 %	-0.78	9.3	± 1.5	± 90

Rated current: 1250 A
Transformation ratio: 1250 A/5 A Burden: 3.75 VA, cos β = 1

At percentage of rated current	Errors		Permissible errors for accuracy class 0.5	
	Current error	Phase displacement	Current error	Phase displacement
	%	Minutes	%	Minutes
120 %	0.33	4.0	± 0.5	± 30
100 %	0.32	4.2	± 0.5	± 30
20 %	0.18	9.9	± 0.75	± 45
5 %	-0.08	21.3	± 1.5	± 90

Rated current: 1250 A
Transformation ratio: 1250 A/5 A Burden: 15 VA, cos β = 0.8

At percentage of rated current	Errors		Permissible error for accuracy class 5P	
	Current error	Phase displacement	Current error	Phase displacement
	%	Minutes	%	Minutes
100 %	-0.15	0.8	± 1	± 60

The measured current error and phase displacement values are within the limits permissible for accuracy class 0.5 for measuring current transformers and class 5P for protective current transformers.

6. Short-time current tests

6.1 Dynamic test and thermal short-time current test

6.1.1 Test laboratory

High-power test laboratory, high current test bay

6.1.2 Normative document

IEC 60044-1: 1996-12, mod. + am1: 2000-07, Sub-clause 7.1

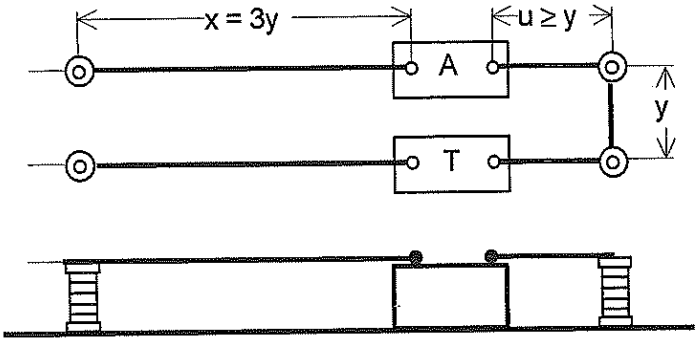
6.1.3 Required test parameters

Short-circuit current	31.5	kA
Peak current	80	kA
Duration of short-circuit	3	s
Joule integral	2977 x 10^6	A^2s

6.1.4 Test arrangement

The test was carried out single-phase in accordance with the STL guide to the interpretation of IEC 60044-1. A second current transformer of the same type was set up in the return conductor.
The pole centres distance was to the manufacturer's instructions.
The distance x was 690 mm, the distances u and y were 230 mm.
The test object was connected by copper bars of 80 mm x 10 mm.
The secondary windings were short-circuited by flexible copper conductors of 10-mm^2 cross-section.

See Figures 9 and 10, Sheet 24.



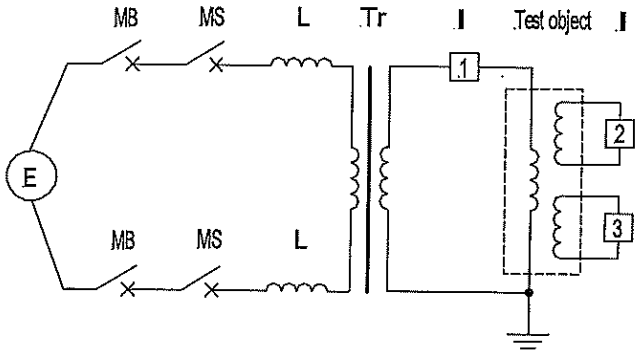
A Auxiliary current transformer
T Test object
y Minimum pole centre distance declared by the client

Figure 3: Test arrangement for the short-time current tests

6.1.5 Test and measuring circuits

Technical data of the test circuit

Test requirement		Short-time current tests
Test No.		103 0801 and 103 0802
Number of phases (Test circuit)		1
Number of poles/phases (Test object)		1
Power frequency Hz		50
Power factor cos φ		‹ 0.15
Earthing conditions	Grid	Not earthed
	Short-circuit transformer	Not earthed
	Short-circuit point	Earthed
Short-circuit power of the test circuit		150 MVA
Current measurement		Rogowski measuring device



E	Power supply	Tr	Short-circuit transformer
MB	Master breaker	I	Current measurement
MS	Making switch	1 - 3	Measuring points
L	Current limiting reactor		

Figure 4: Test circuit

Technical data of the measuring circuits

Test No.	Measuring point	Symbol in oscillograms	Measuring quantity	Measuring sensor/device
103 0801 and 103 0802	1	i	Short-circuit current primary winding	Rogowski measuring device
	2	i1 sek	Short-circuit current secondary winding 1	Rogowski measuring device
	3	i2 sek	Short-circuit current secondary winding 2	Rogowski measuring device
Recording instrument: BE256 transient recorder				

6.1.6 Test results

Test object:	Current transformer, Serial No. 03/00811
Condition of test object before test:	Prestressed
Connection of test object:	See Sheet 13
Short-circuit point:	Secondary windings
Ambient temperature:	15 °C

Test values:

Test No.	103 ...	0801	0802
Peak current primary winding	kA	81.7	52.6
Short-circuit current, r.m.s. value primary winding	kA	30.3	32.6
Short-circuit current, r.m.s. value secondary winding 1	A	195	166
Short-circuit current, r.m.s. value secondary winding 2	A	211	-
Short-circuit duration	ms	205	3010
Joule integral 10^6	A^2s	-	3199
Short-circuit current 3 s	kA	-	32.7
Note		1)	2)

Notes:

1) Test with dynamic current
2) Test with short-time thermal current

Condition of test object after test:

The current transformer did not show any visible damage. See Figure 10, Sheet 24.

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6.2 Determination of errors after the short-time current test

Rated current: 1250 A
Transformation ratio: 1250 A/5 A Burden: 15 VA, cos β = 0.8

At percentage of rated current	Difference between the errors measured before and after the short-time current test		Permissible errors for accuracy class 0.5	
	Current error	Phase displacement	Current error	Phase displacement
	%	Minutes	%	Minutes
120 %	0.01	0.4	± 0.25	± 15
100 %	0.01	0.4	± 0.25	± 15
20 %	0.00	0.3	± 0.375	± 22.5
5 %	-0.03	1.4	± 0.75	± 45

Rated current: 1250 A
Transformation ratio: 1250 A/5 A Burden: 3.75 VA, cos β = 1

At percentage of rated current	Difference between the errors measured before and after the short-time current test		Permissible errors for accuracy class 0.5	
	Current error	Phase displacement	Current error	Phase displacement
	%	Minutes	%	Minutes
120 %	0.00	0.4	± 0.25	± 15
100 %	0.00	0.3	± 0.25	± 15
20 %	0.00	0.6	± 0.375	± 22.5
5 %	0.01	-0.1	± 0.75	± 45

The measured differences of current error and phase displacement are within the limits permissible for accuracy class 0.5. The test object is able to comply with the requirements of accuracy class 0.5 after the short-time current test.

Determination of errors after the short-time current test (continued)

Rated current: 1250 A
Transformation ratio: 1250 A/5 A Burden: 15 VA, cos β = 0.8

At percentage of rated current	Difference between the errors measured before and after the short-time current test		Permissible error for accuracy class 5P	
	Current error	Phase displacement	Current error	Phase displacement
	%	Minutes	%	Minutes
100 %	0.0	-0.2	± 0.5	± 30

The measured differences of current error and phase displacement are within the limits permissible for accuracy class 5P. The test object is able to comply with the requirements of accuracy class 5P after the short-time current test.

ВЯРНО С ОРИГИНАЛА

6.3 Routine test after the short-time current test

The dielectric routine tests to Sub-clause 6.2 of the normative document are part of the type test – short-time current test – and serve to assess the latter.

Results

Test	Test parameters	Test results	
Power-frequency withstand test on the primary winding	Test voltage: 45 kV Test frequency: 50 Hz Duration of test: 60 s	No disruptive discharge	o.k.
Partial discharge measurement	Procedure A Prestress duration: 60 s Measuring voltage (points 1 to 3): $1.2 \times U_m$ = 28.8 kV U_m = 24.0 kV $1.2 \times U_m/\sqrt{3}$ = 16.6 kV Measuring time: 30 s	 Partial discharge < 2 pC < 50 pC Partial discharge < 2 pC < 50 pC Partial discharge < 2 pC < 20 pC	o.k.
Power-frequency withstand test on the secondary windings	Test voltage: 2.7 kV Test frequency: 50 Hz Duration of test: 60 s	No disruptive discharge	o.k.
Interturn overvoltage test	Procedure A Test current (primary): 1250 A Test voltage (secondary 1): 373 V Test voltage (secondary 2): 1093 V Test frequency: 50 Hz Duration of test: 60 s	No disruptive discharge	o.k.

Notes:

The routine tests did not show anything that could have indicated a damage done to the test object during the previous short-time current test.

7. Temperature-rise test

7.1 Test laboratory

Low-voltage test laboratory, test room 3

7.2 Normative document

IEC 60044-1: 1996-12, mod. + am1: 2000-07, Sub-clause 7.2

7.3 Required test parameters

Test current	1500	A
Test frequency	50	Hz

7.4 Test arrangement

To IEC 60044-1: 1996, mod. + am1: 2000, Sub-clause 7.2

The current transformer was tested in a single-phase outdoor current circuit. Both cores were subjected to their rated burden with a power factor cos β = 1.

7.5 Test and measuring circuits

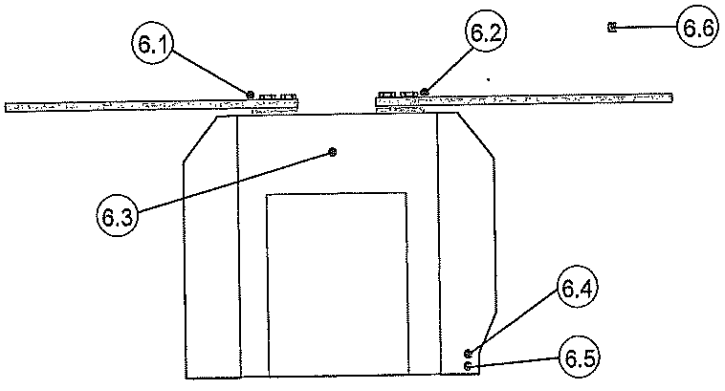

Figure 5: Arrangement of temperature measuring points

Test and measuring circuits (continued)

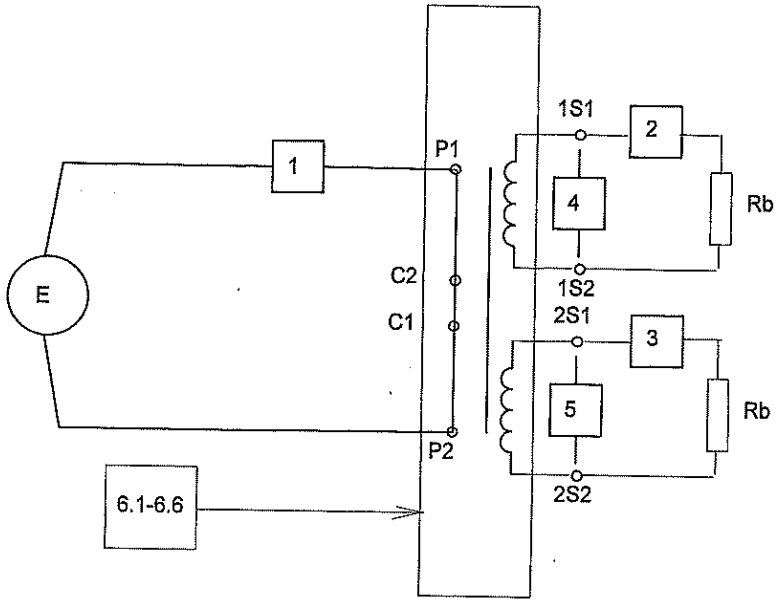

Figure 6: Circuit for the temperature-rise test

Technical data of measuring circuits

Measuring point	Measured quantity	Measuring sensor/device
1	Test current	Current transformer, digital display device
2 and 3	Secondary current	Digital display device
4 and 5	Winding resistance	Milliohmmeter PM 04
6.1 to 6.6	Temperature	Therm 5500-3, CoCo thermocouples

7.6 Test results

The test current was 1500 A (50 Hz). This is equivalent to the rated primary continuous thermal current of the current transformer.

Meas. point	Designation of the part	Material	Permissible temperature-rise limit K	Measured final temperature at ΔT≤1K/h °C	Final temperature rise (related to average ambient air temperature) K
6.1	Current bar	Cu	80	59.3	42.6
6.2	Current bar	Cu	80	61.1	44.4
6.3	Transformer case	Insulating material	-	45.6	-
6.4	5-A winding 1	Cu wire	75	84.1	67.4
6.5	5-A winding 2	Cu wire	75	83.4	66.7
6.6	Ambient air	Air	-	16.7	-

Determination of the current transformer's winding temperature rise.

The current transformer was tested at rated burden. The temperature rise θ of the current transformer winding was determined on the basis of the rise of winding resistance from the cold state to the steady state of temperature rise of the complete assembly using the following formula given by DIN VDE 0532 Teil 2, Sub-clause 3.3 (transformers and reactors).

$$\theta_W = \frac{R_W}{R_k} (235 + \theta_k) - 235$$

Where:
- R_k Cold resistance of the winding at 18.5 °C
- R_W Warm resistance of the winding at 16.7 °C of ambient air temperature
- θ_k Cold temperature of winding
- θ_W Final temperature of the winding

The hot resistance of the secondary winding was calculated on the basis of the measurement of the cooling curve.

	R_k mΩ	R_W mΩ	R_W/R_k	θ_W °C	θ K	Permissible K
Core 1/5 A	136.3	171.6	1.26	84.1	67.4	75
Core 2/5 A	192.8	242.2	1.26	83.4	66.7	75

Test results (continued)

Graphic representation of resistance variation (core 1)

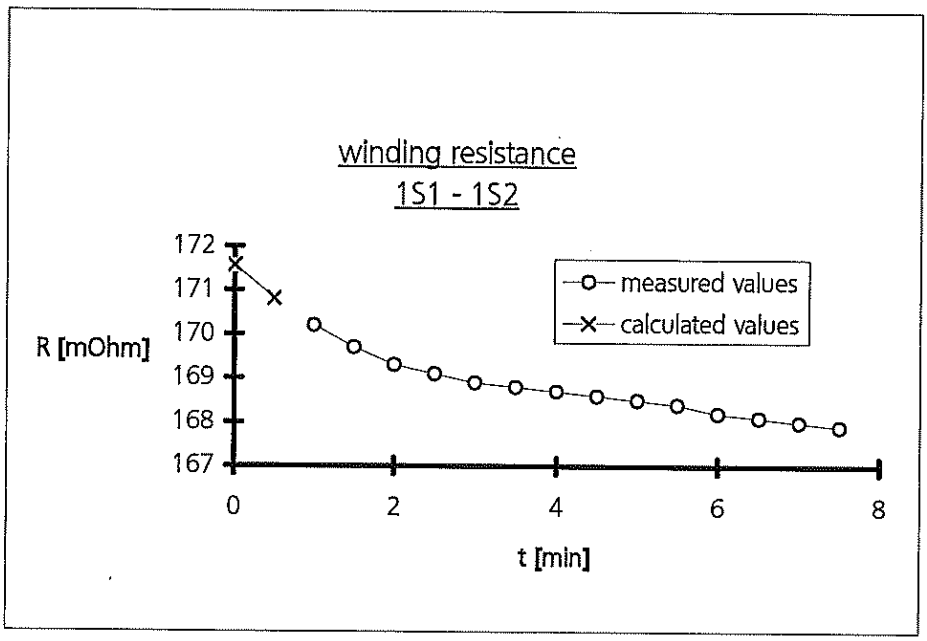

Figure 7: Cooling curve of core 1

Graphic representation of resistance variation (core 2)

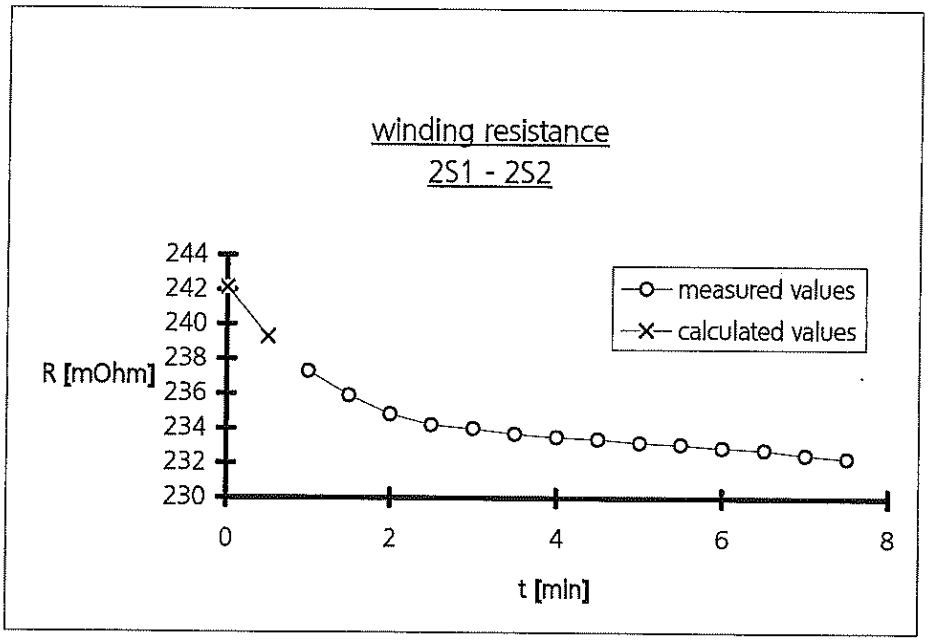

Figure 8: Cooling curve of core 2